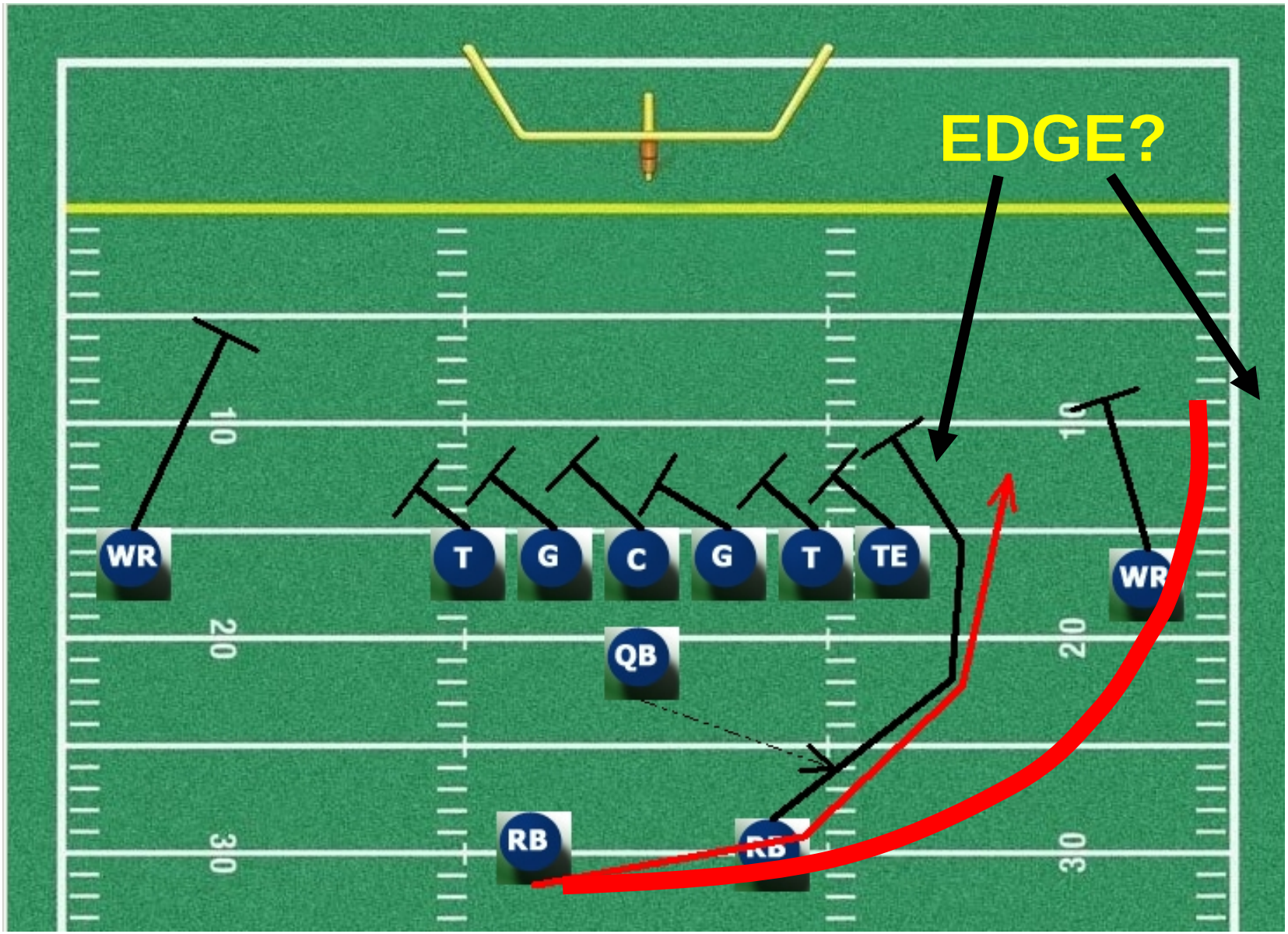
# Forecasts for the Edge

**Chris Hill**

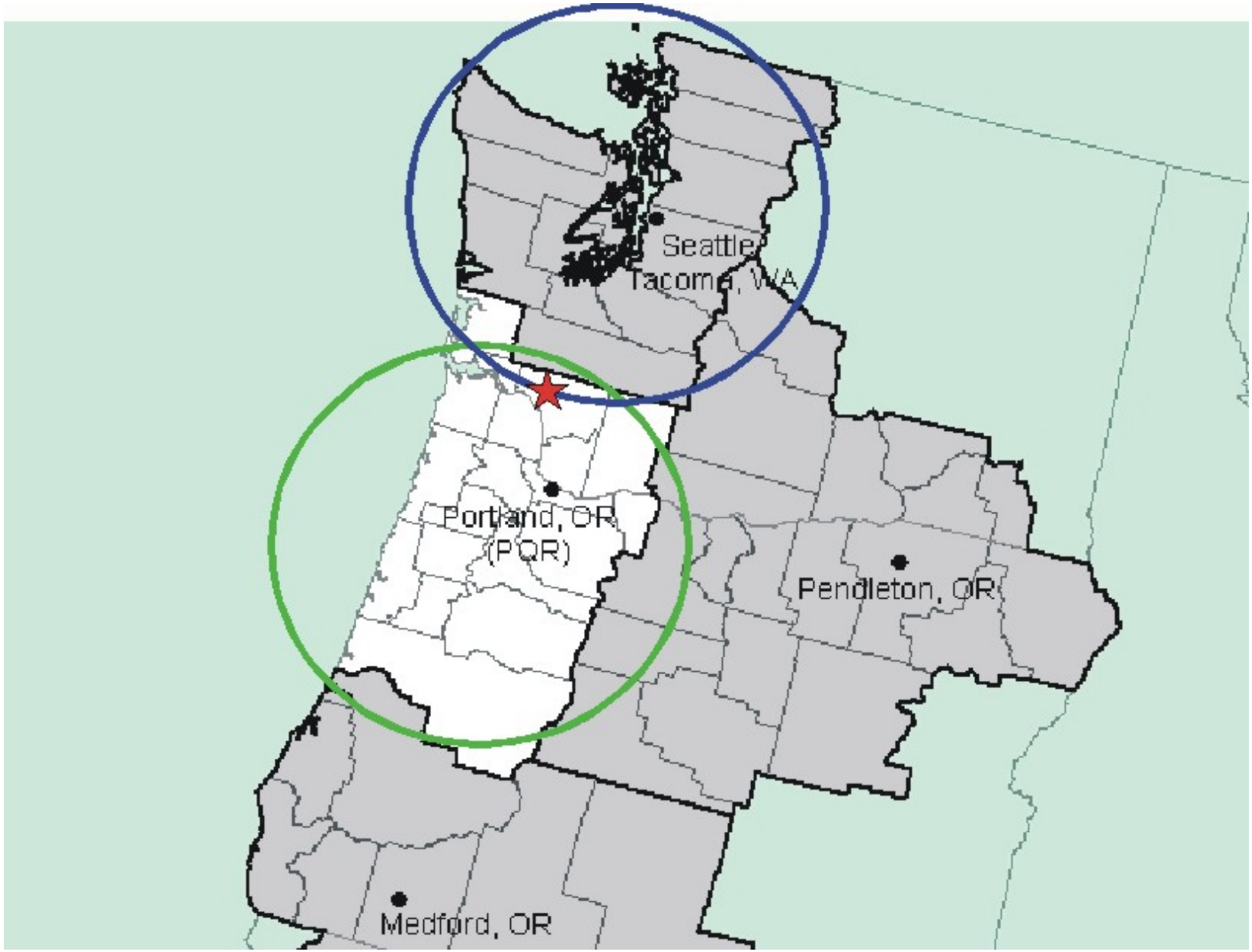
29 Feb 2008

# “I Told You So”

**by artist Ed Miracle**


EDGE?
WR
T
G
C
G
T
TE
WR
QB
RB
RB
10
20
30
10
20
30

The Edge
U2LAFANS.COM

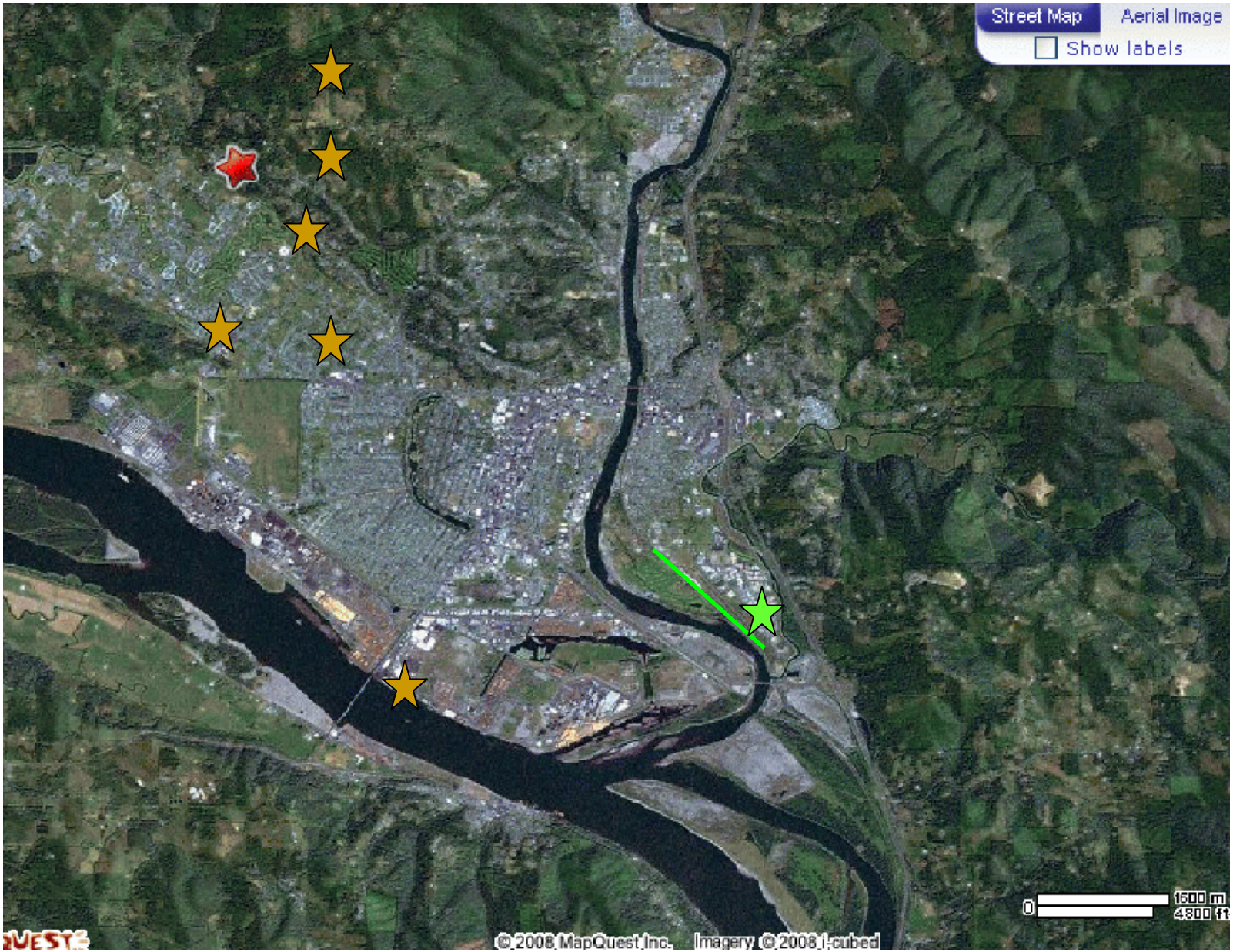

Seattle,
Tacoma, WA
Portland, OR
(PQR)
Pendleton, OR
Medford, OR

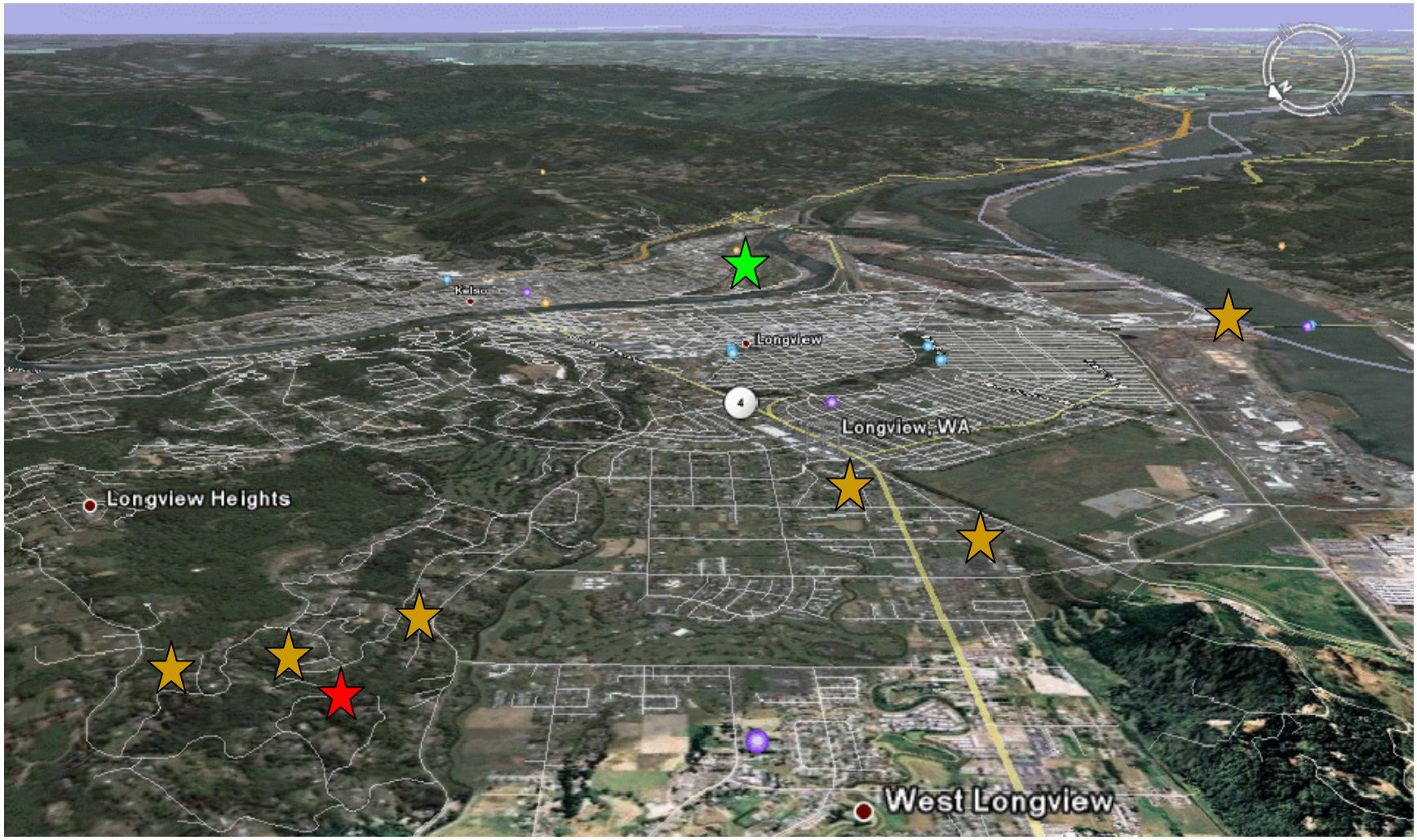
# Goals Of This Talk

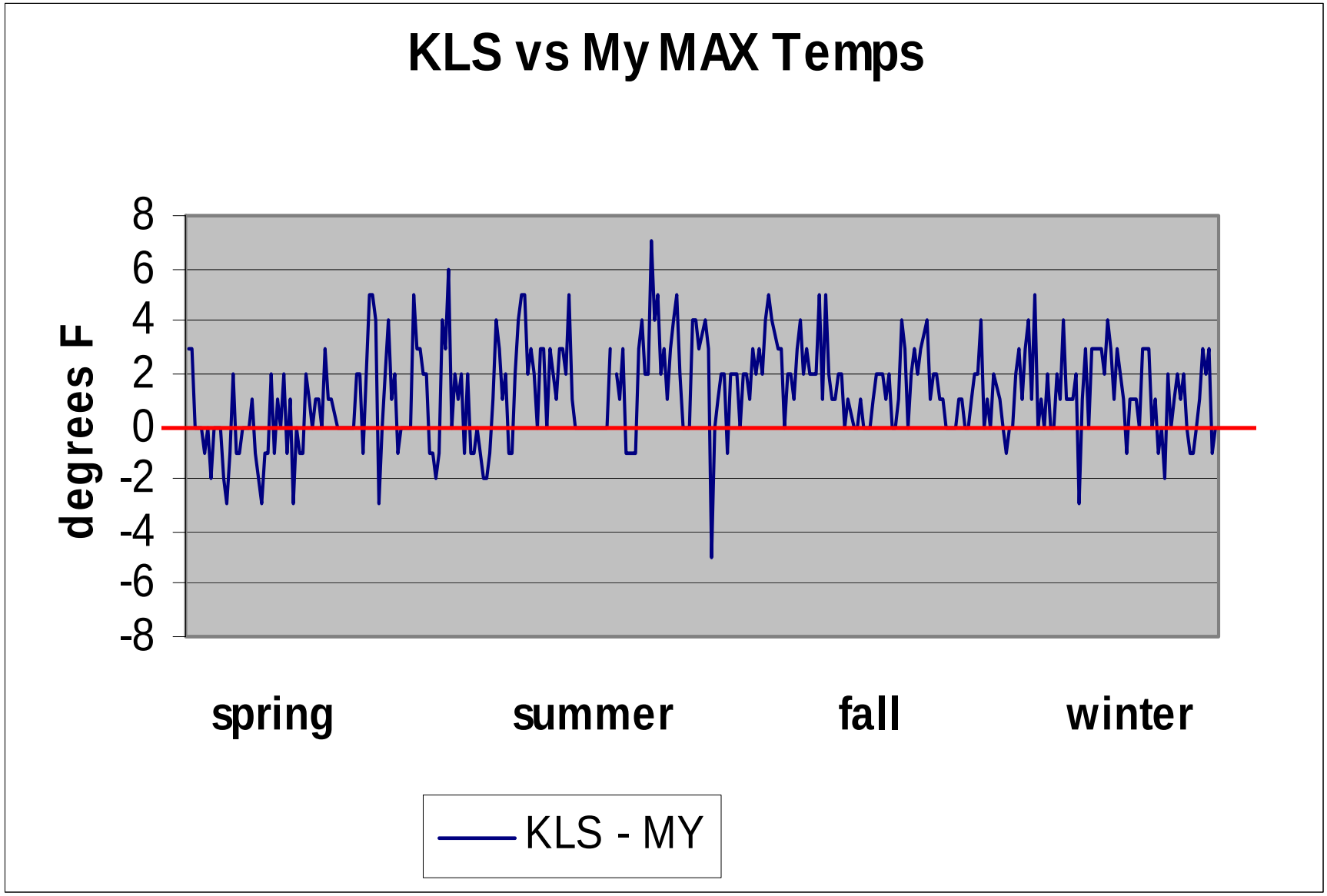
- Is there a source of forecasts for my house that is consistently more accurate than the other sources?
- Are the forecasts for my house useful, e.g. accurate often enough to use as a planning tool?
- Does being on “the edge” mean the forecasts are less useful than those for “metro” areas?

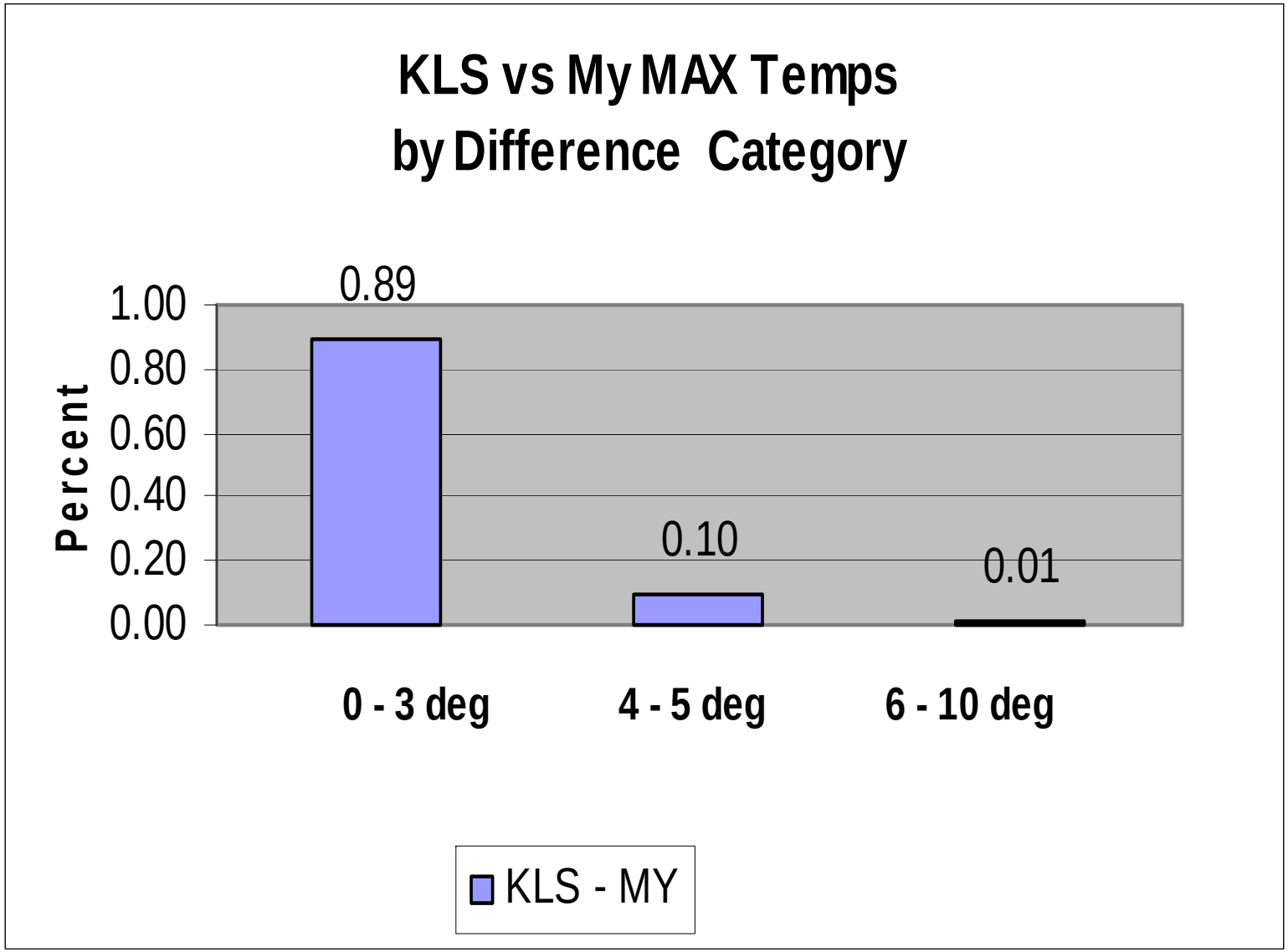
# What will be verified

- “Tomorrow’s” daytime maximum temperature
- “Tomorrow’s” Probability of Precipitation (**POP**) forecast
- Based on observed data from the ASOS at the Kelso Airport (**KLS**)
- If a forecast is unavailable the previous forecast will be used, e.g., a persistence of the forecast, not a persistence of the weather


Street Map
Aerial Image
Show labels
0
1600 m
4800 ft
©2008 MapQuest Inc.
Imagery ©2008 I-cubed


Longview
Longview, WA
Longview Heights
West Longview


KLS vs My MAX Temps
degrees F
8
6
4
2
0
-2
-4
-6
-8
spring
summer
fall
winter
KLS - MY


KLS vs My MAX Temps
by Difference Category
Percent
1.00
0.80
0.60
0.40
0.20
0.00
0.89
0.10
0.01
0 - 3 deg
4 - 5 deg
6 - 10 deg
KLS - MY

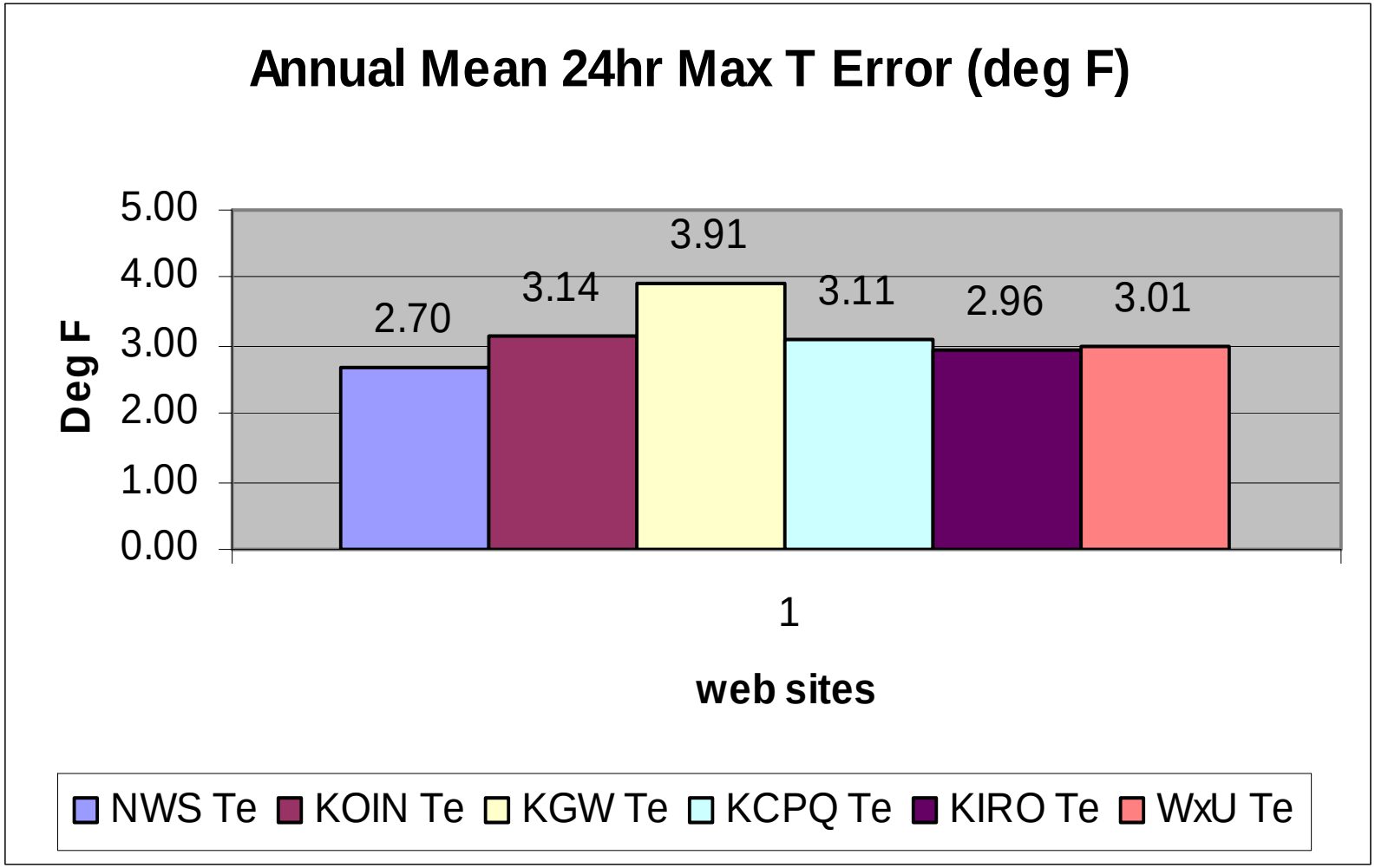
# Forecasts Verified

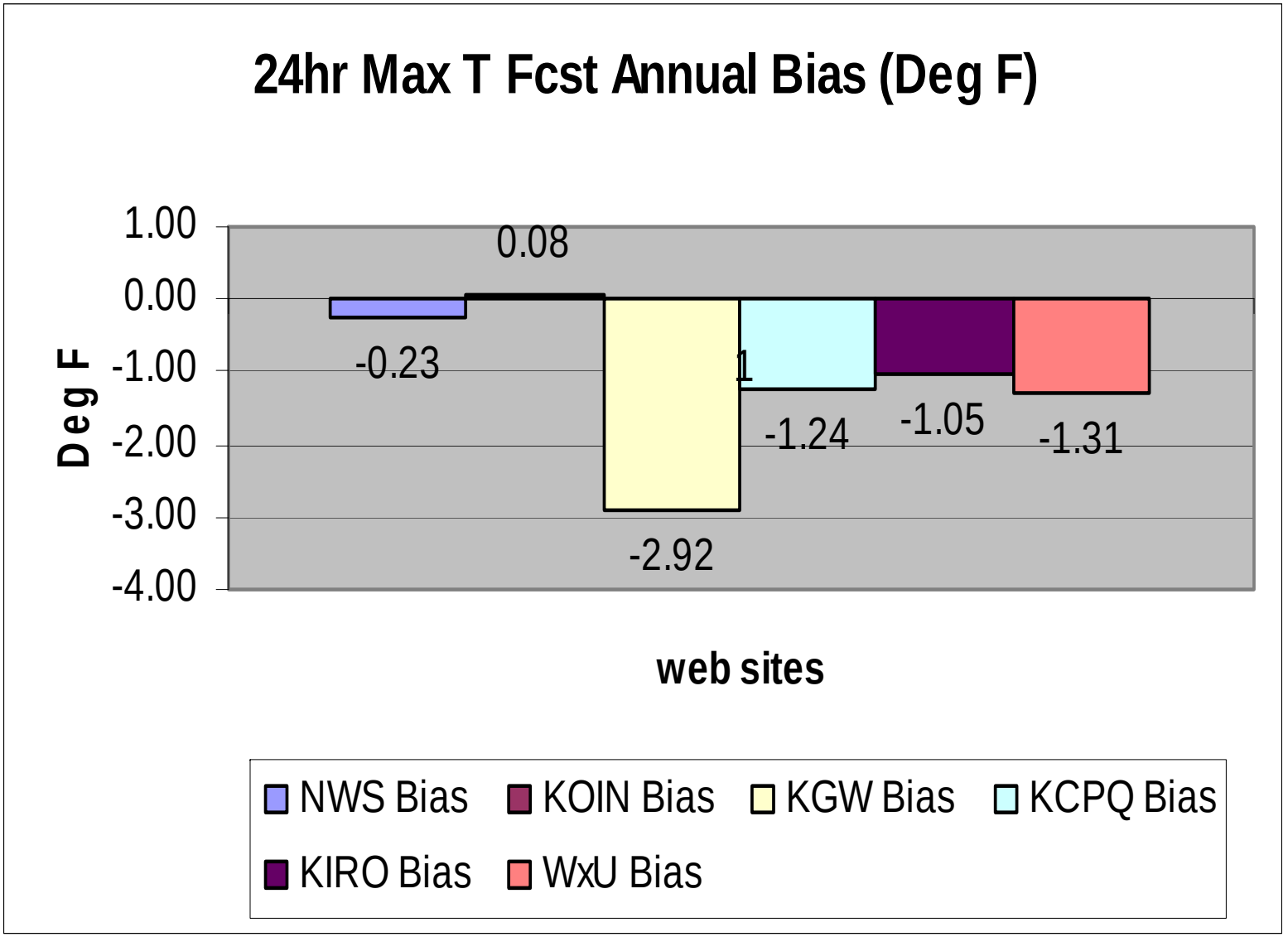
- **NWS Portland** (State Forecast Table – SFT)
- **NWS Model Output Statistics** (MOS)
  - MAV
  - MET
  - MEX
- **University of Washington**
  - MM5 GFS 12 km
  - MM5 GFS 4 km
  - ProbCast
  - Ensemble Bayesian Model Averaging

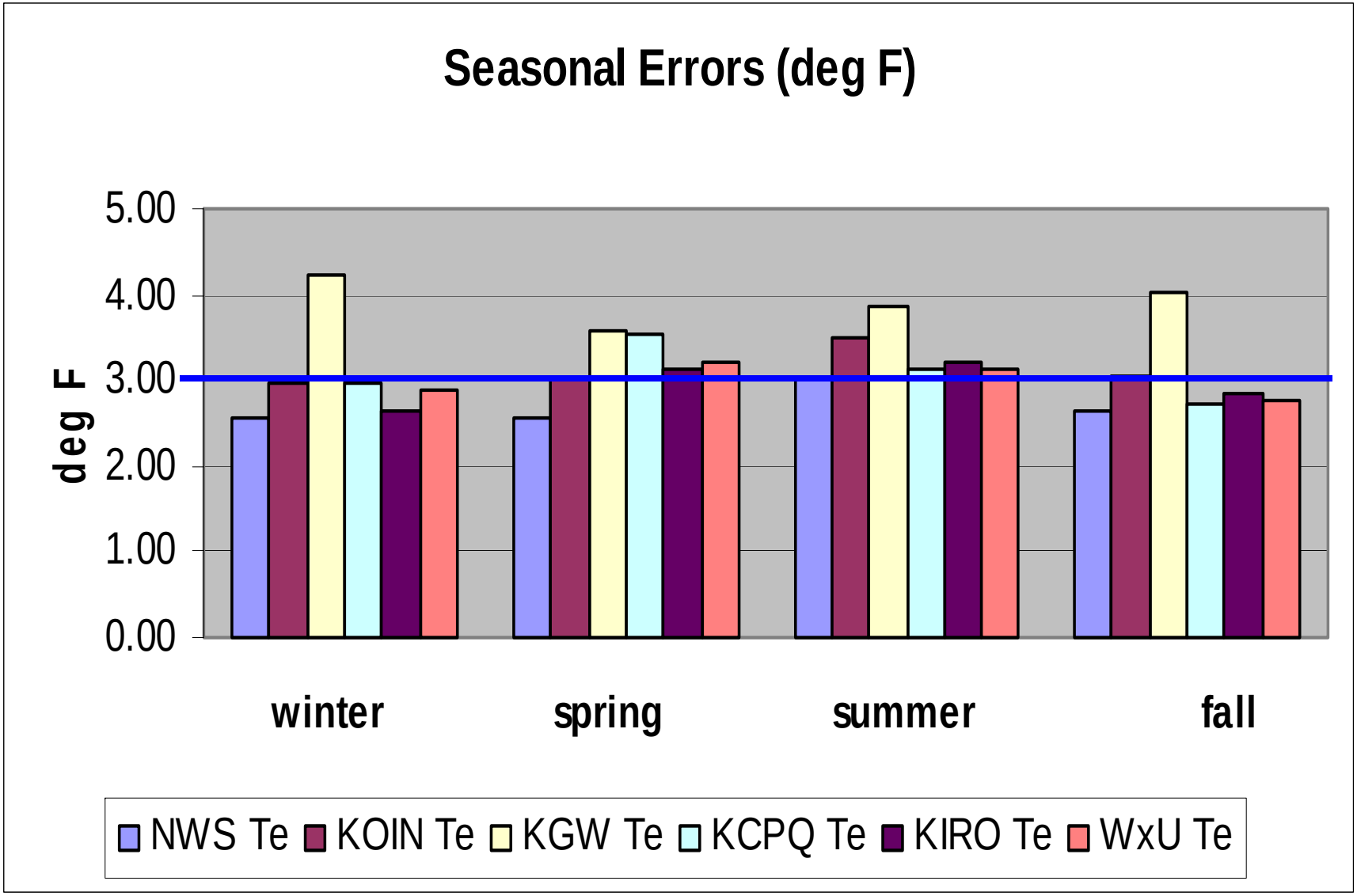
# Forecasts Verified cont.

- **Television Station Web Sites**
  - ABC (KATU Portland/KOMO Seattle)
  - CBS (KOIN Portland/KIRO Seattle)
  - NBC (KGW Portland/KING Seattle/NWCN)
  - FOX (KCPQ Seattle, no KPTV Portland forecast)
- **Private Meteorological Services**
  - AccuWeather
  - The Weather Channel
  - Weather Underground
  - MyWeather LLC
  - QuickCast

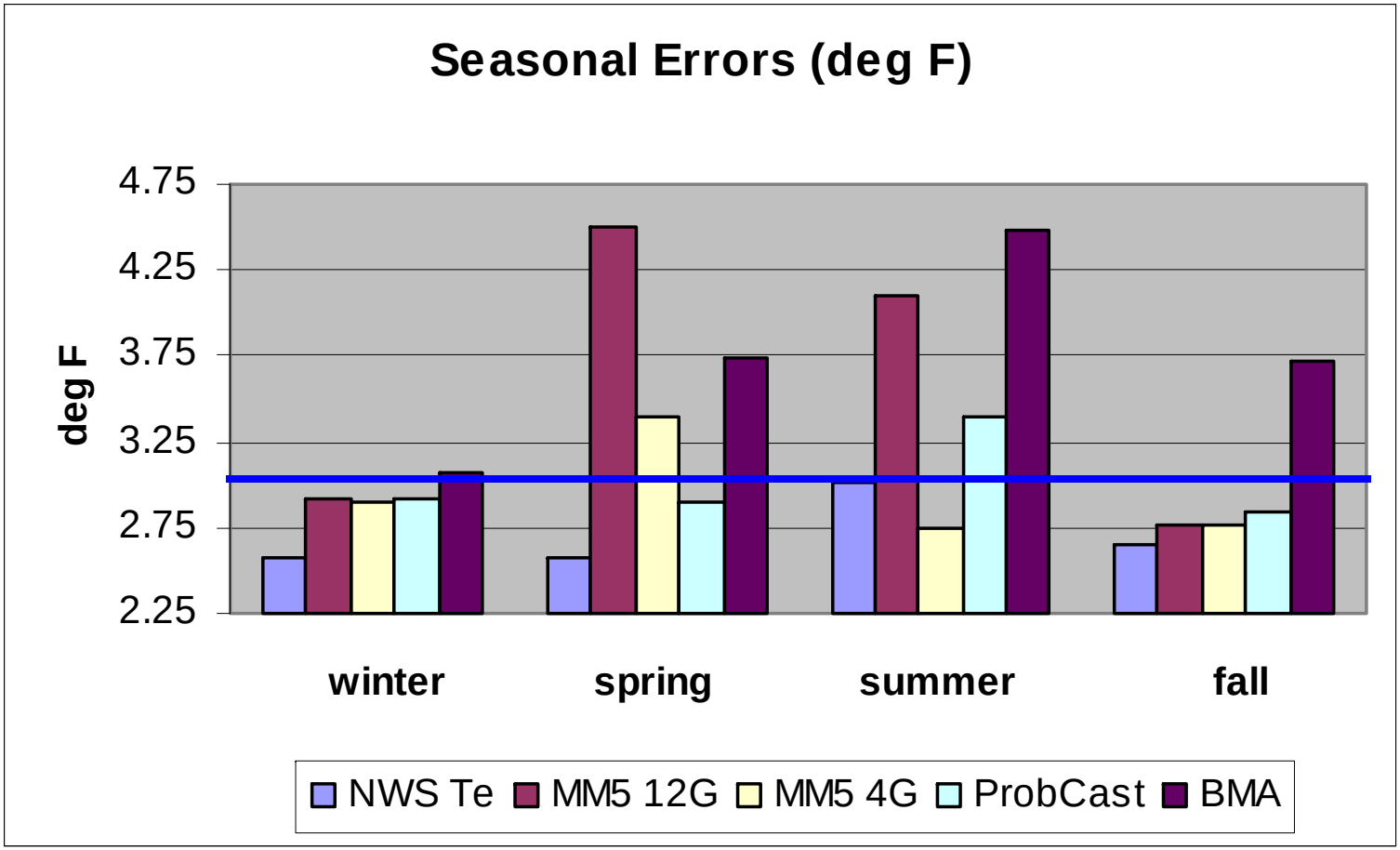
# Providers re-packaging NWS Products

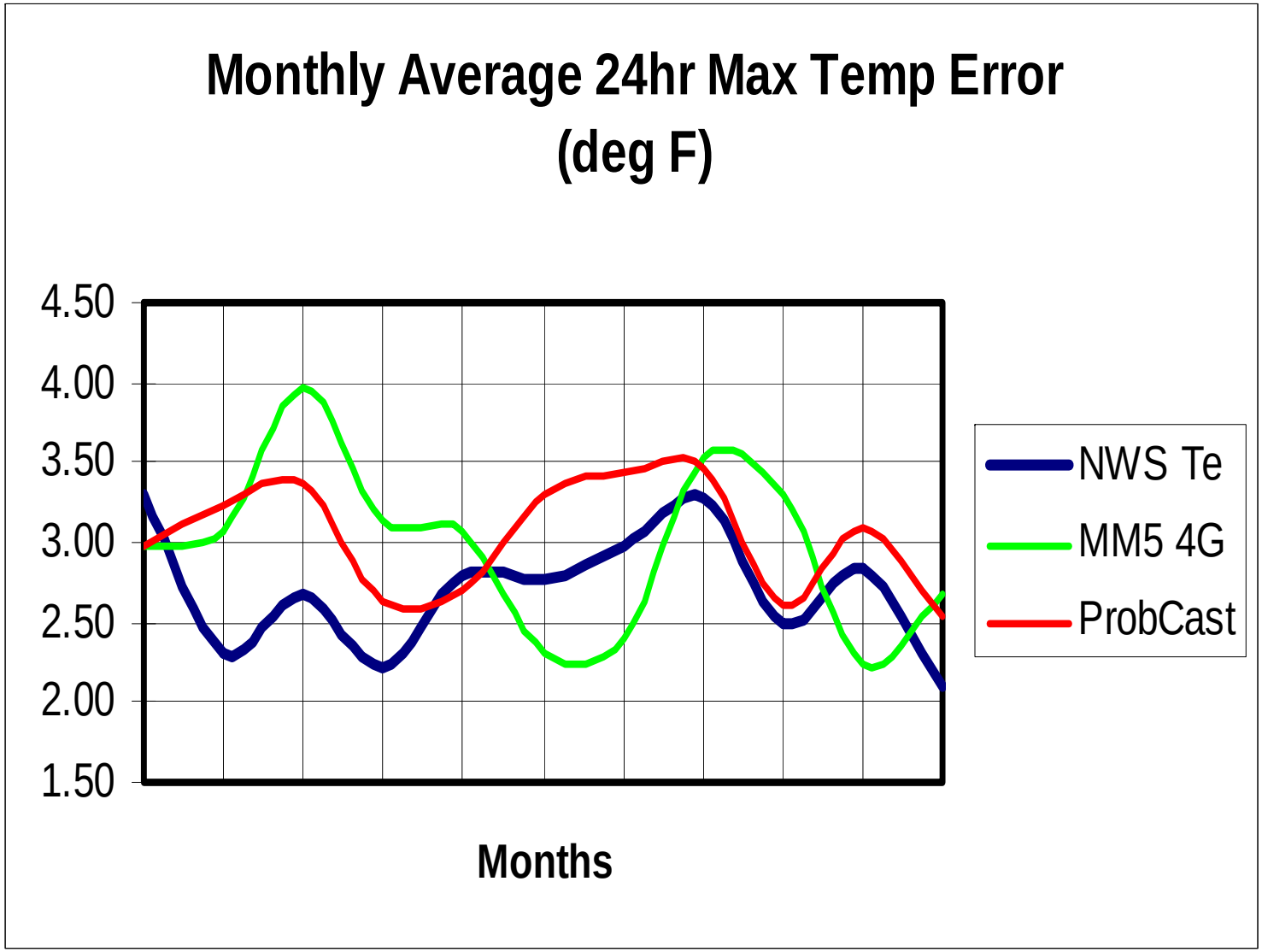



24hr Max T Fcst Annual Bias (Deg F)
1.00
0.00
-1.00
-2.00
-3.00
-4.00
Deg F
0.08
-0.23
-2.92
-1.24
-1.05
-1.31
web sites
NWS Bias
KOIN Bias
KGW Bias
KCPQ Bias
KIRO Bias
WxU Bias

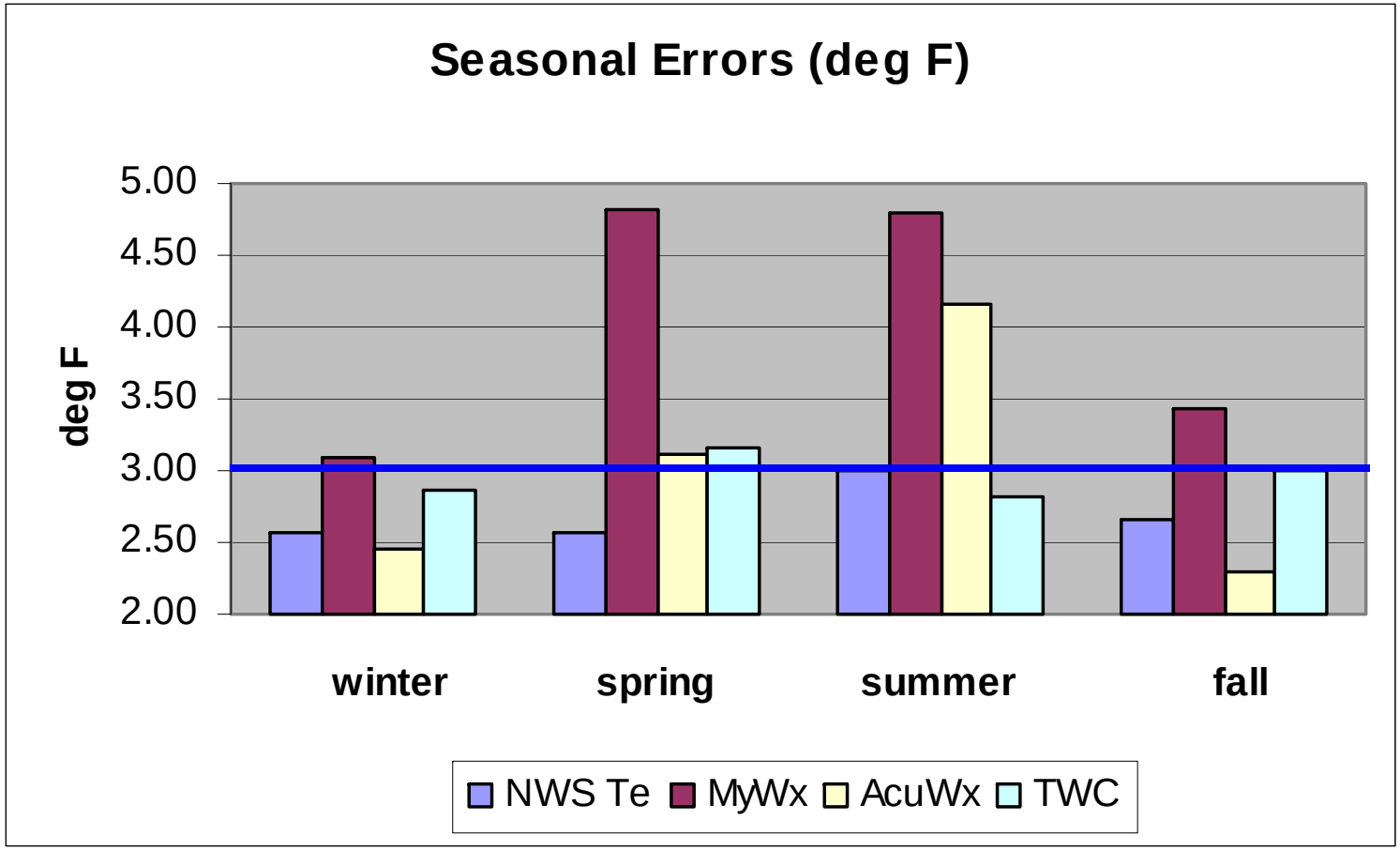

Seasonal Errors (deg F)
deg F
5.00
4.00
3.00
2.00
1.00
0.00
winter
spring
summer
fall
NWS Te
KOIN Te
KGW Te
KCPQ Te
KIRO Te
WxU Te

# University of Washington Products

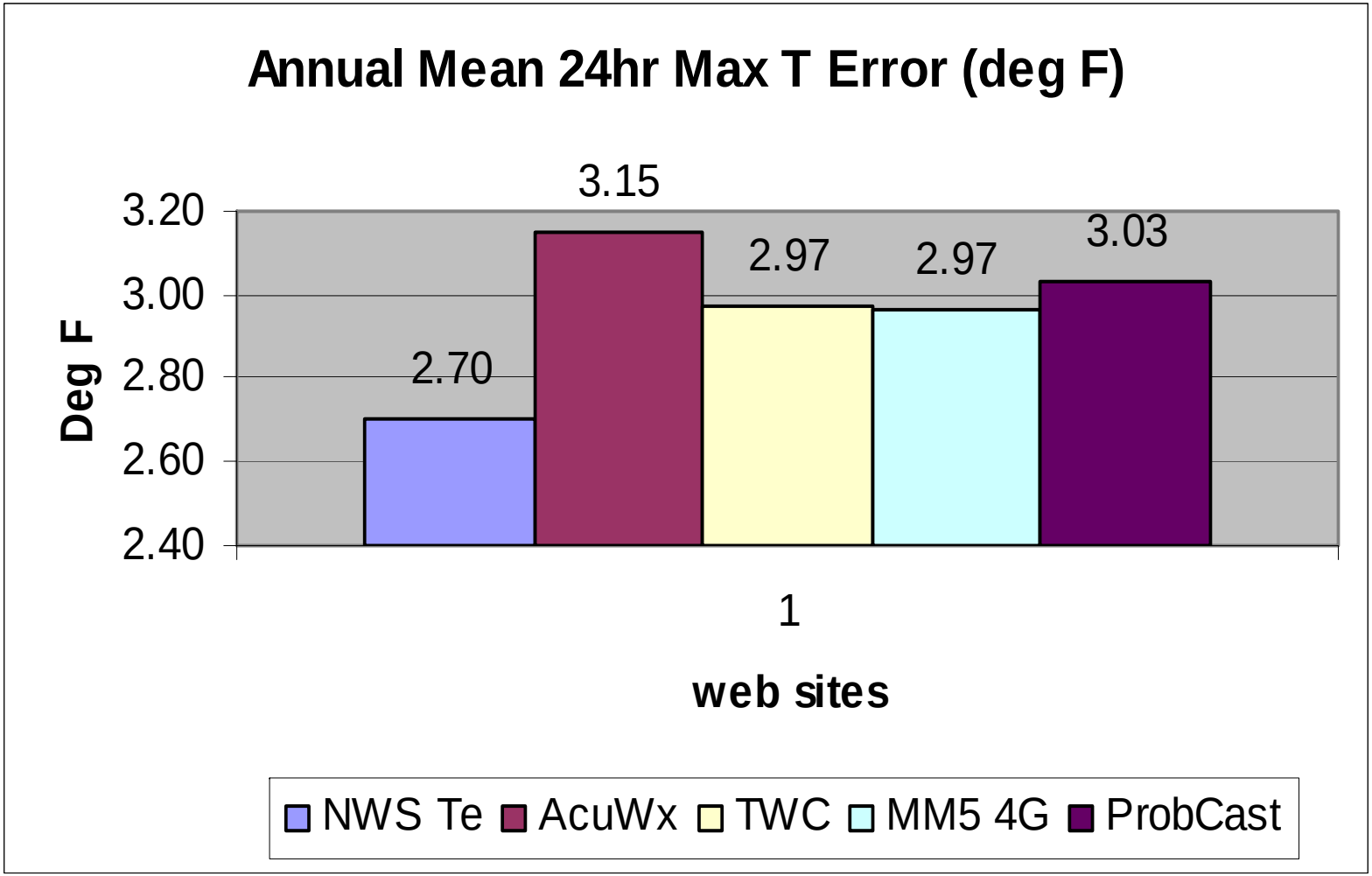


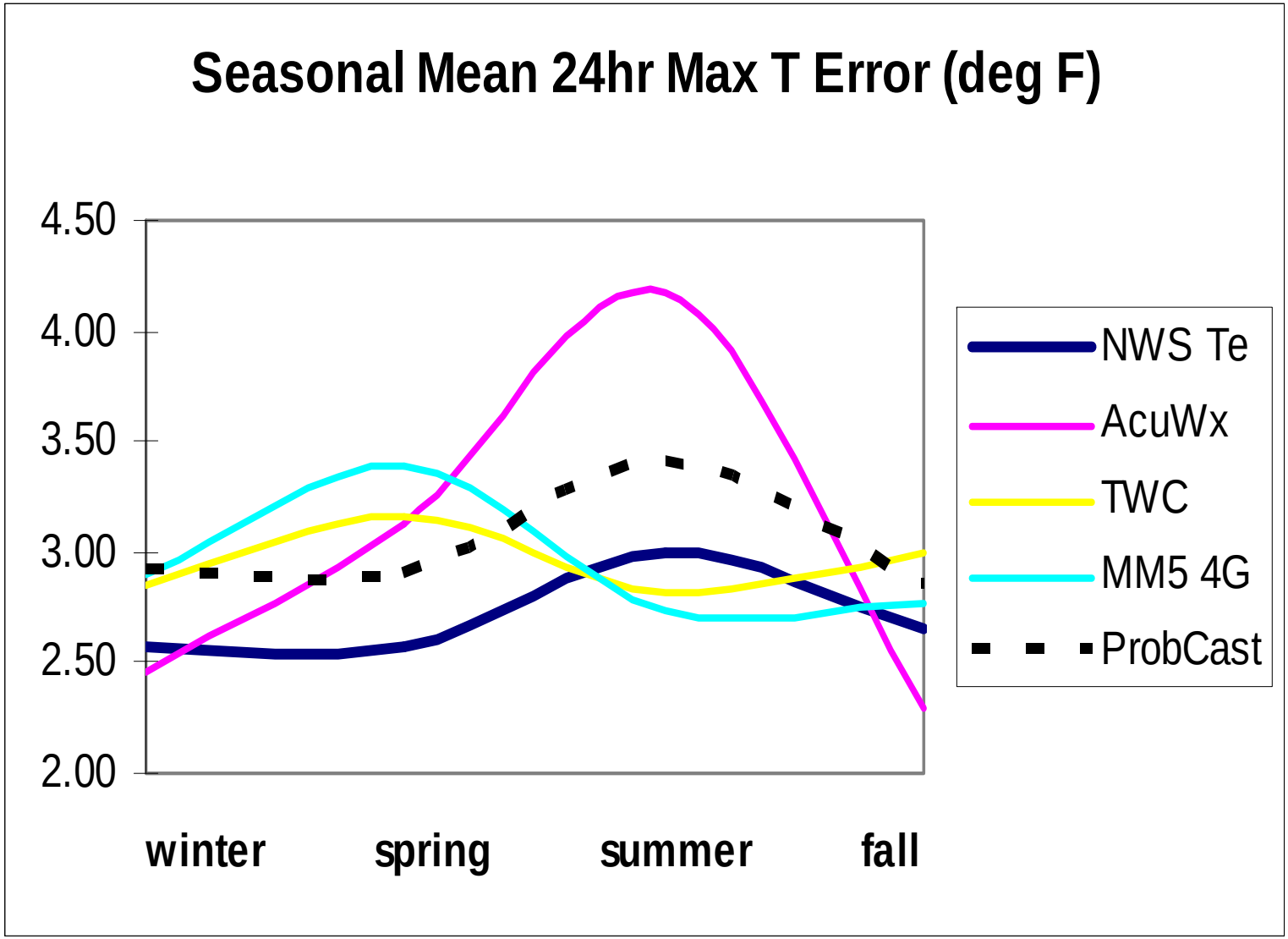

Monthly Average 24hr Max Temp Error
(deg F)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
Months
NWS Te
MM5 4G
ProbCast

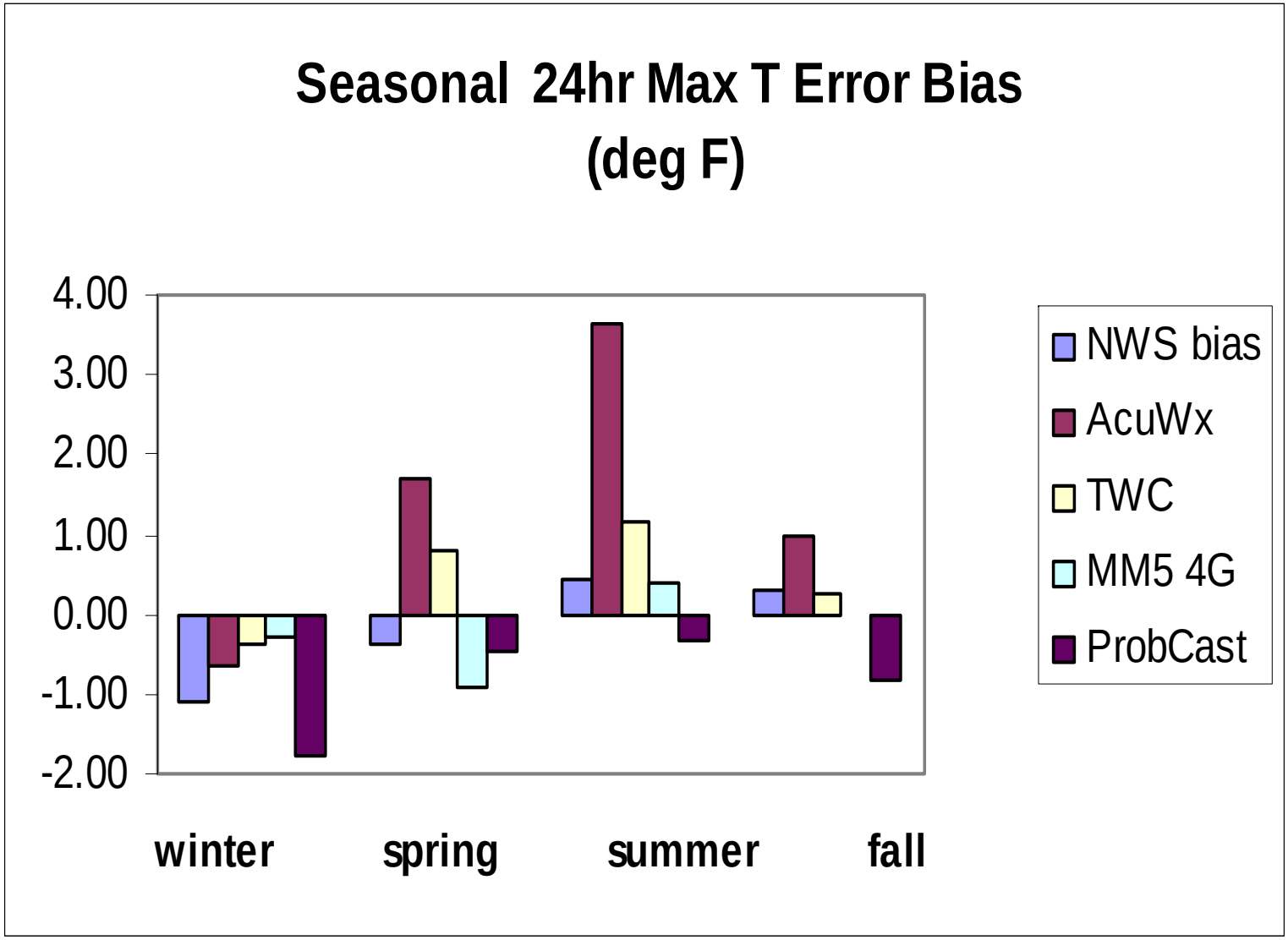
# Private Weather Services

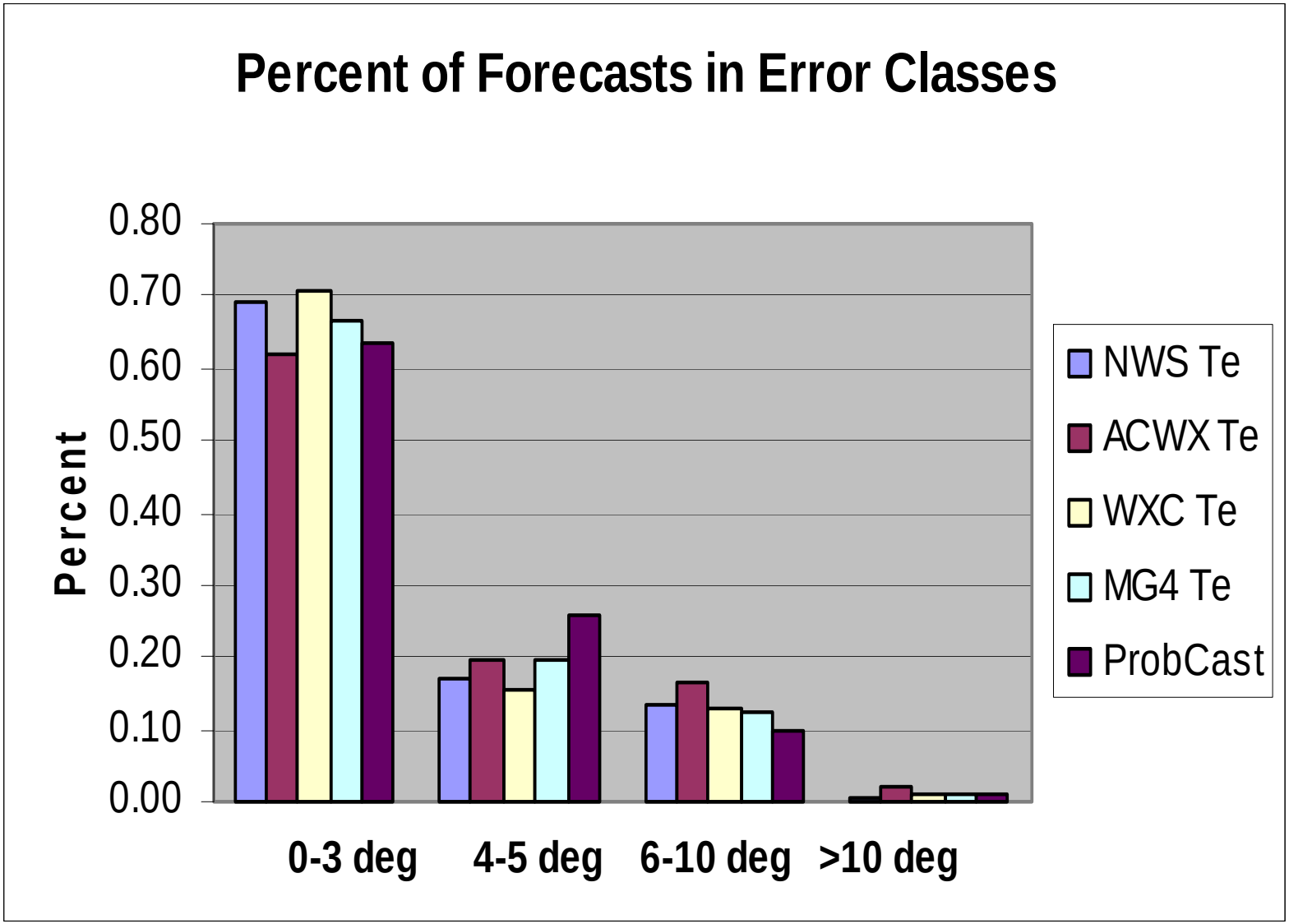


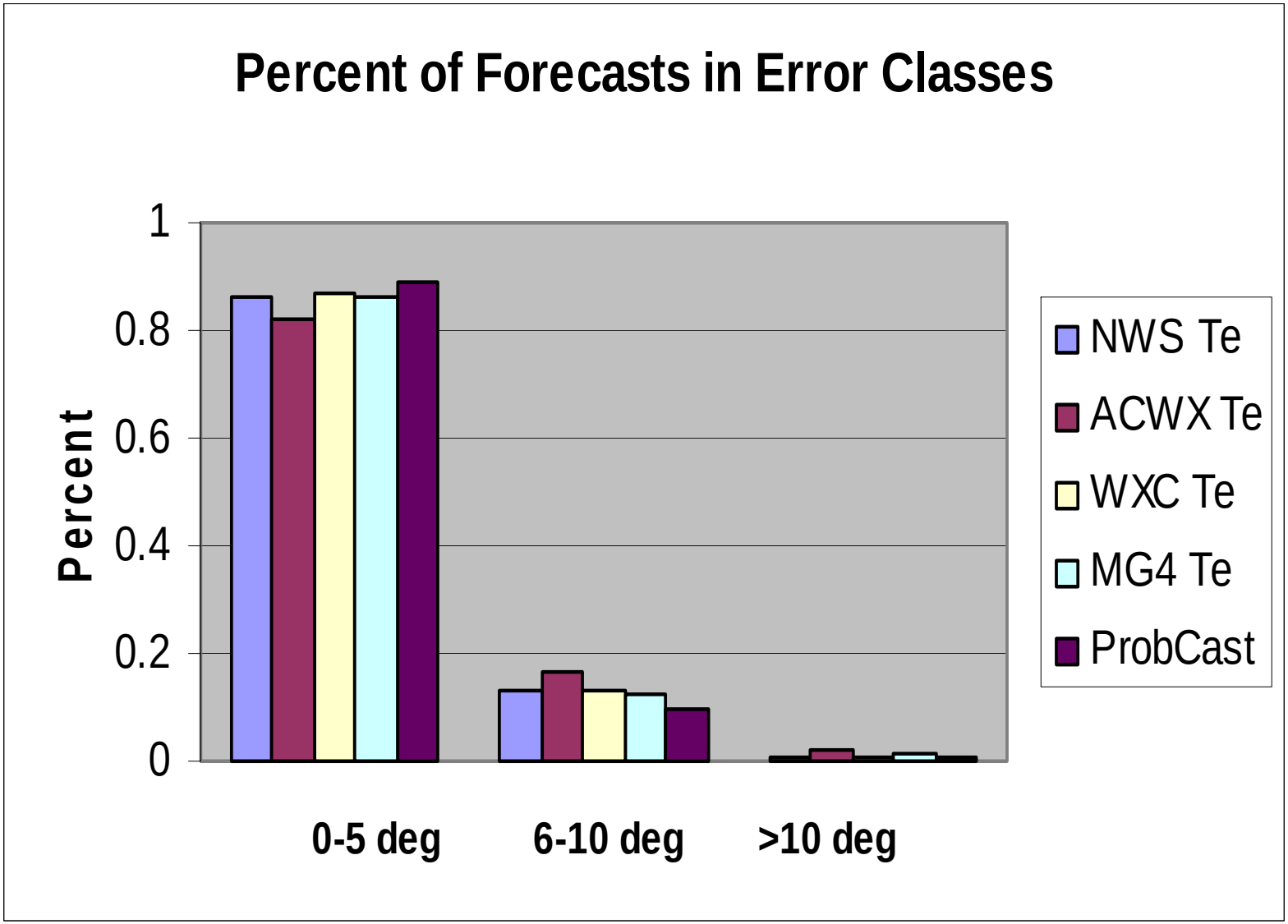
# The Contenders:




Seasonal Mean 24hr Max T Error (deg F)
4.50
4.00
3.50
3.00
2.50
2.00
winter
spring
summer
fall
NWS Te
AcuWx
TWC
MM5 4G
ProbCast


Seasonal 24hr Max T Error Bias
(deg F)
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
winter
spring
summer
fall
NWS bias
AcuWx
TWC
MM5 4G
ProbCast

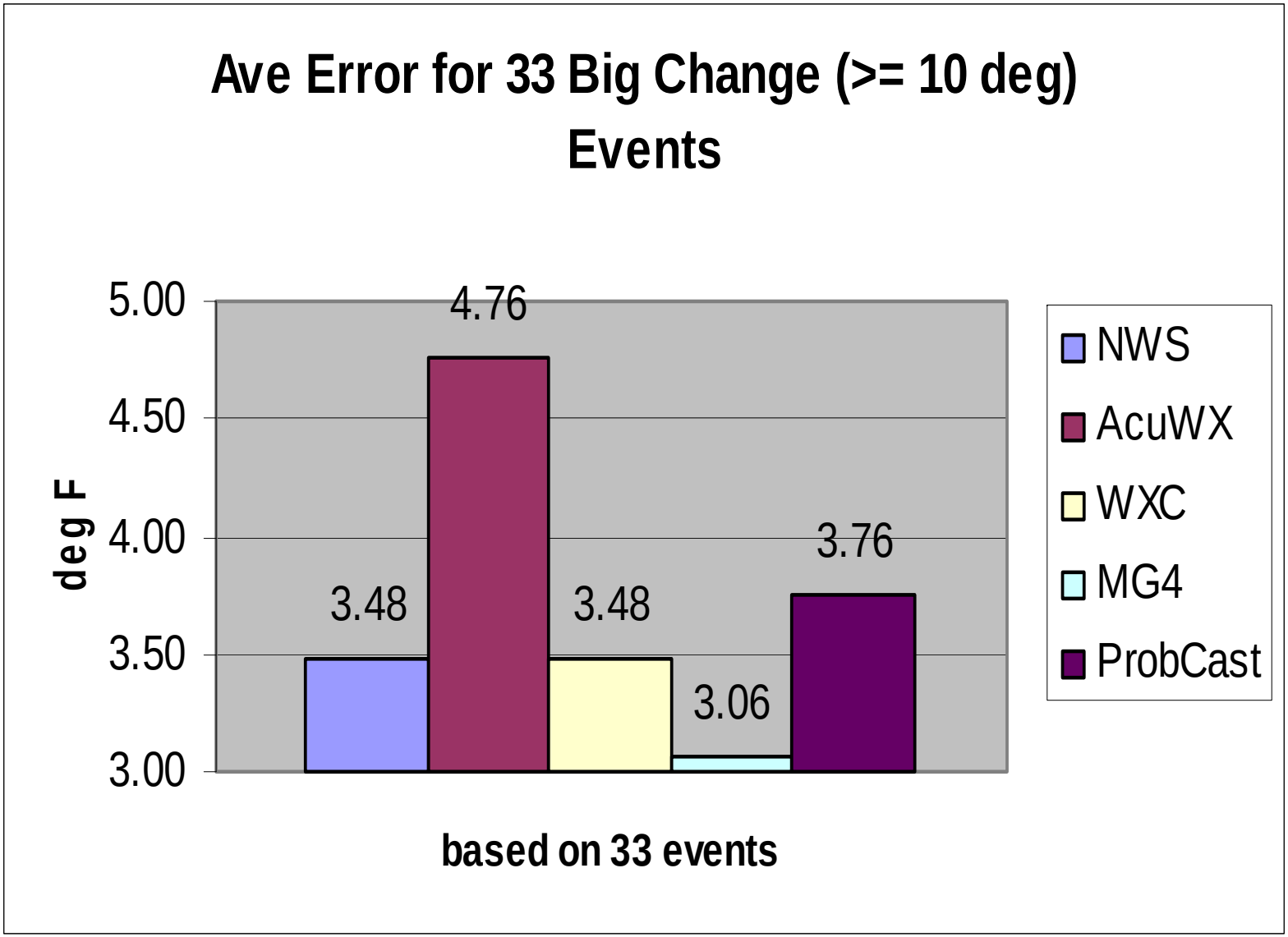

Percent of Forecasts in Error Classes
Percent
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-3 deg
4-5 deg
6-10 deg
>10 deg
NWS Te
ACWX Te
WXC Te
MG4 Te
ProbCast


Percent of Forecasts in Error Classes
Percent
1
0.8
0.6
0.4
0.2
0
0-5 deg
6-10 deg
>10 deg
NWS Te
ACWX Te
WXC Te
MG4 Te
ProbCast

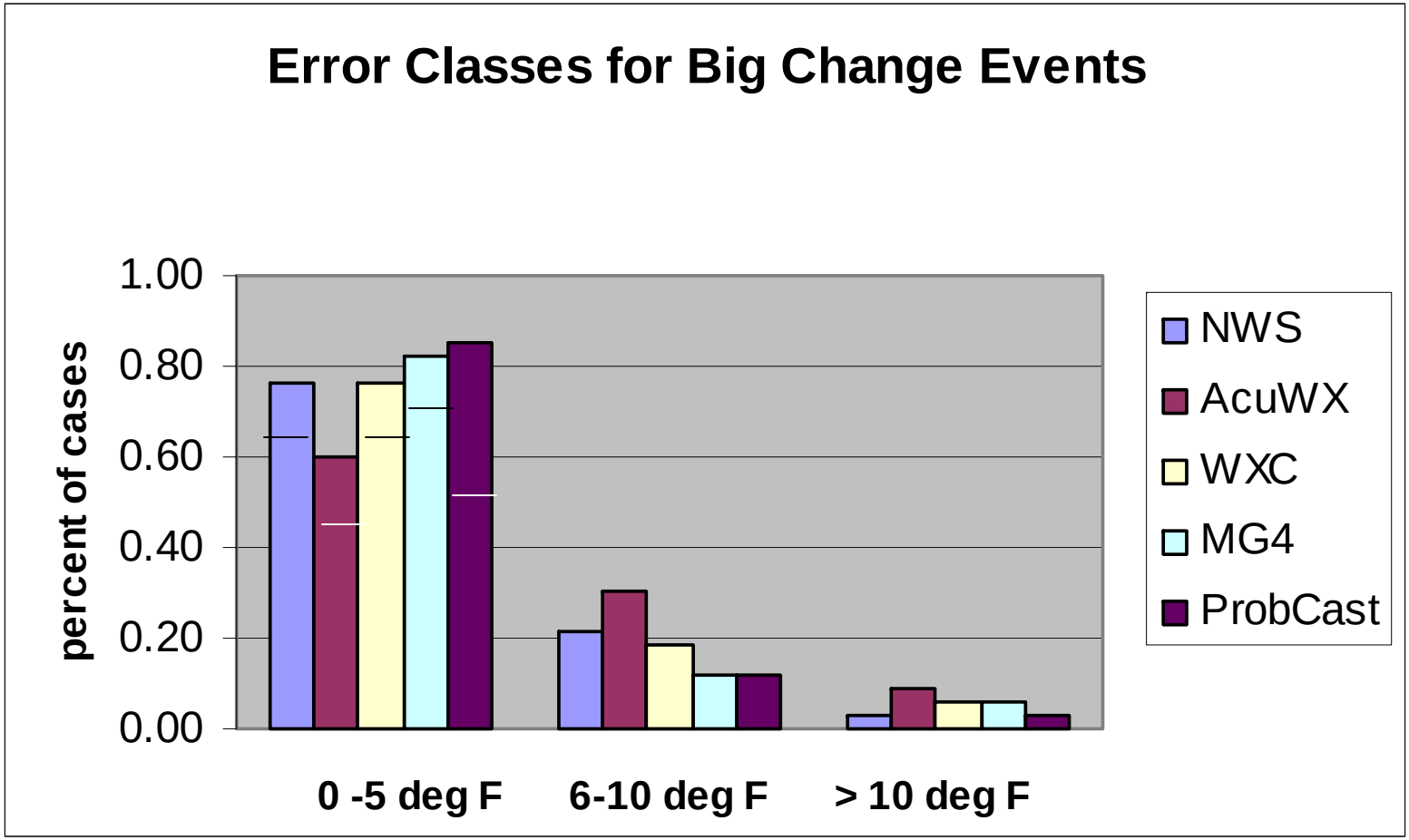
**Still unable to conclusively eliminate any of the contenders –**

**NWS**
**AcuWx**
**TWC**
**MM5 GFS 4km**
**UW ProbCast**

**So look at "Big Change" events**


Ave Error for 33 Big Change (>= 10 deg) Events
5.00
4.50
4.00
3.50
3.00
deg F
4.76
3.48
3.48
3.06
3.76
NWS
AcuWX
WXC
MG4
ProbCast
based on 33 events

# AccuWeather eliminated due to poor performance for big change events.

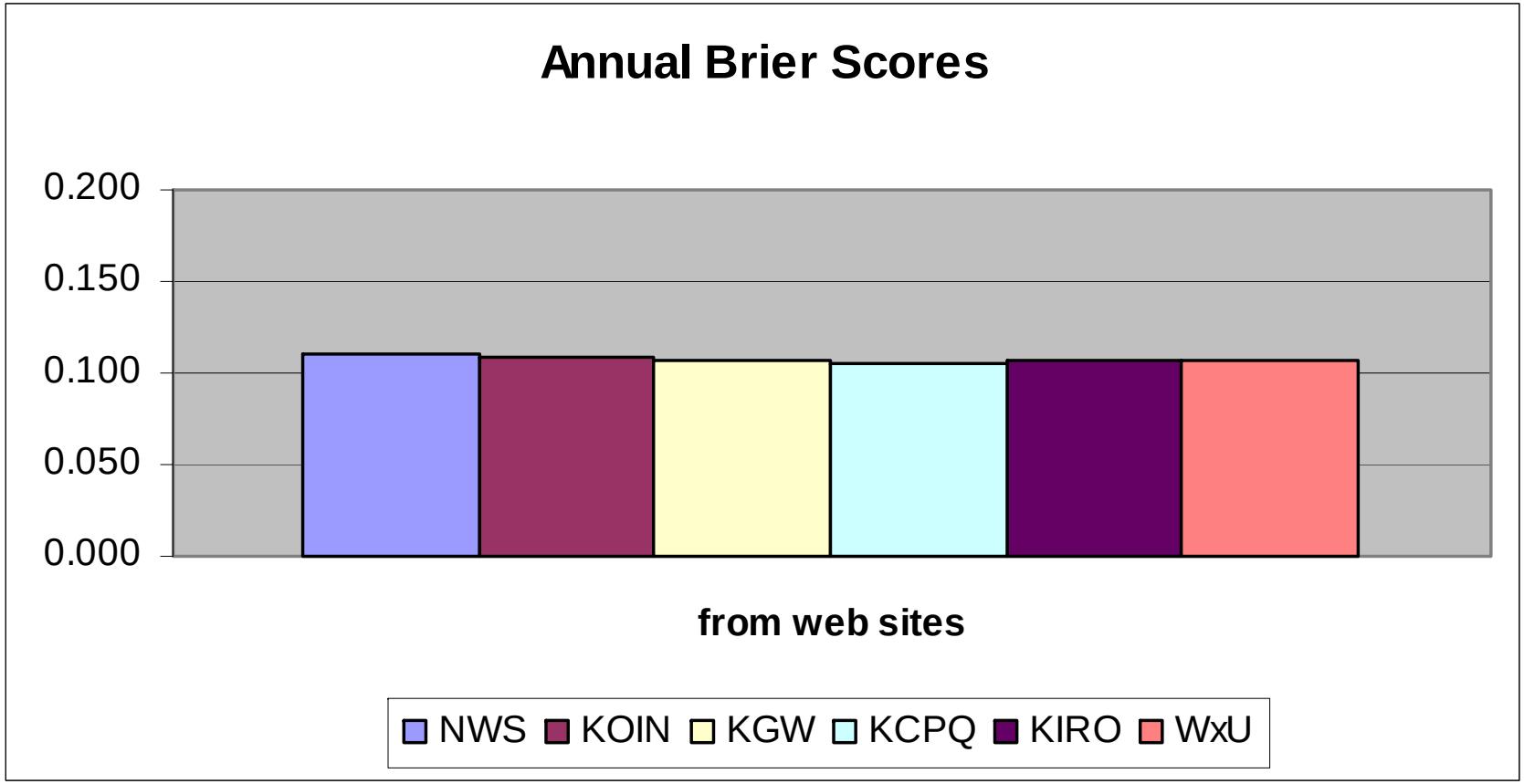


# Summary To This Point:

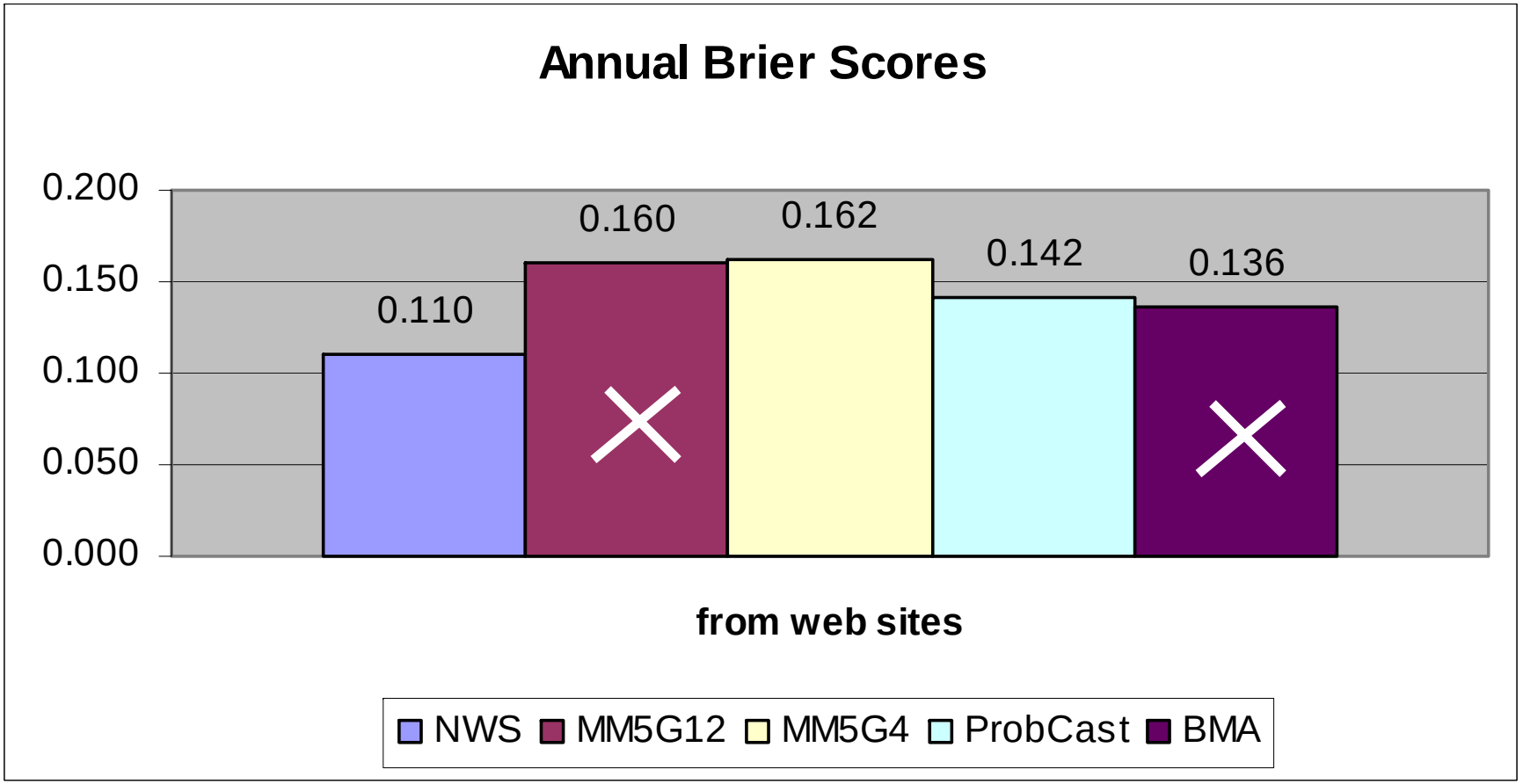
- **At this stage the NWS forecasts and the forecasts from the UW MM5 GFS 4 km model are the leading contenders**.
  - NWS forecasts have the smallest average error, and did better during the Winter, Spring and Fall.
  - MM5 forecasts were best for big change events, and did much better in the Summer.
- **The UW ProbCast and TWC are still in the running however.**

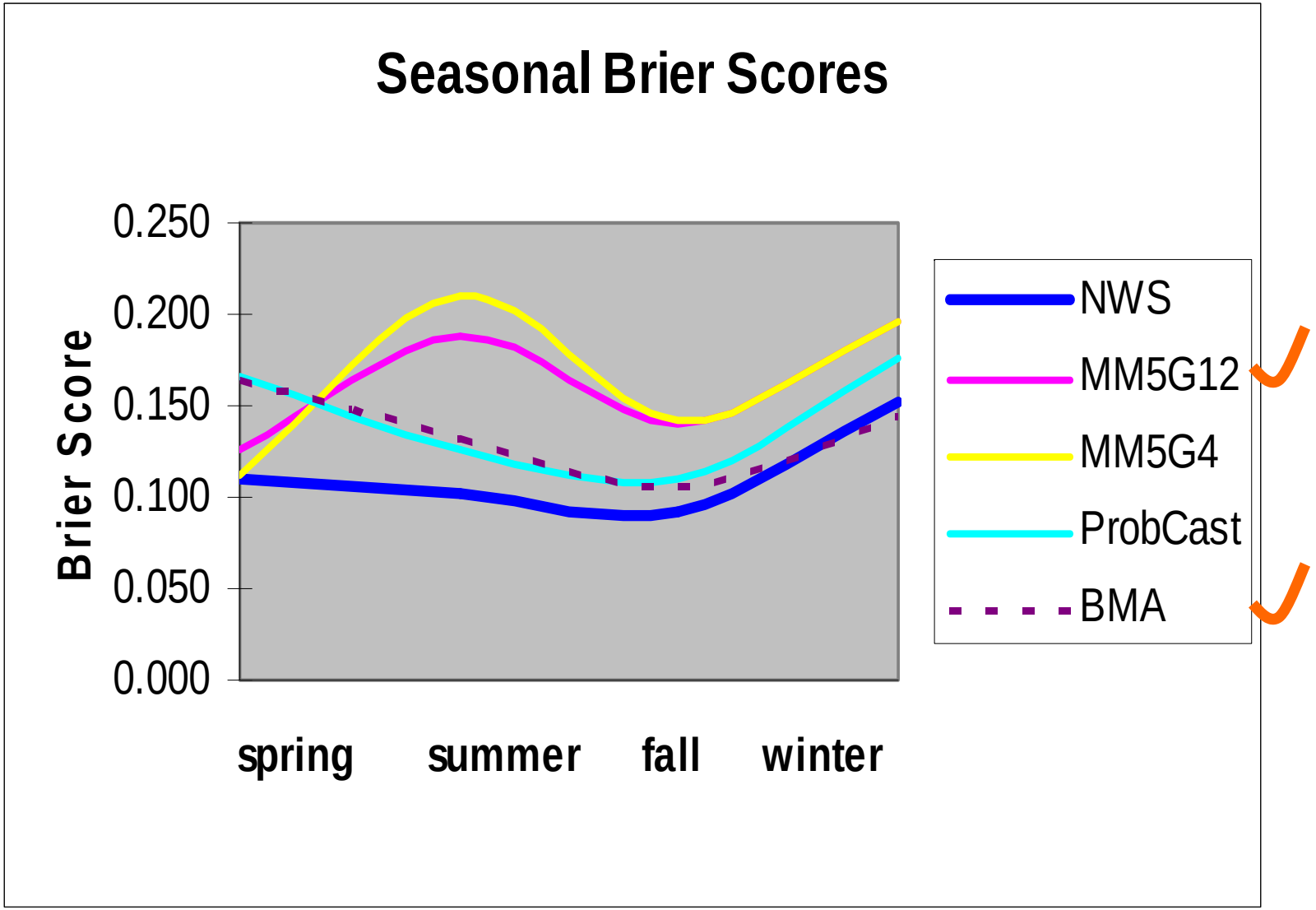
- **So, look at precipitation forecasts . . .**

# Providers re-packaging NWS Products

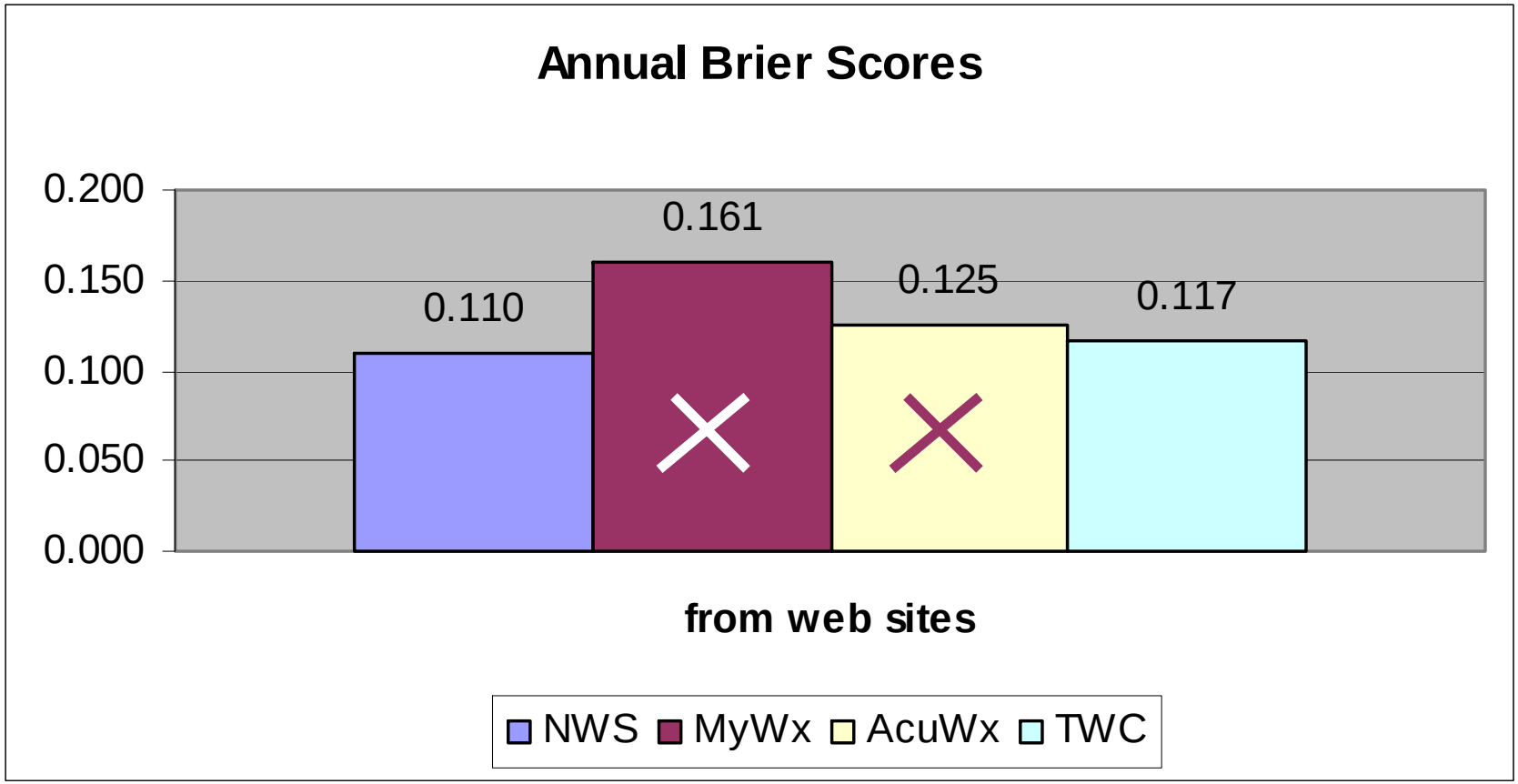


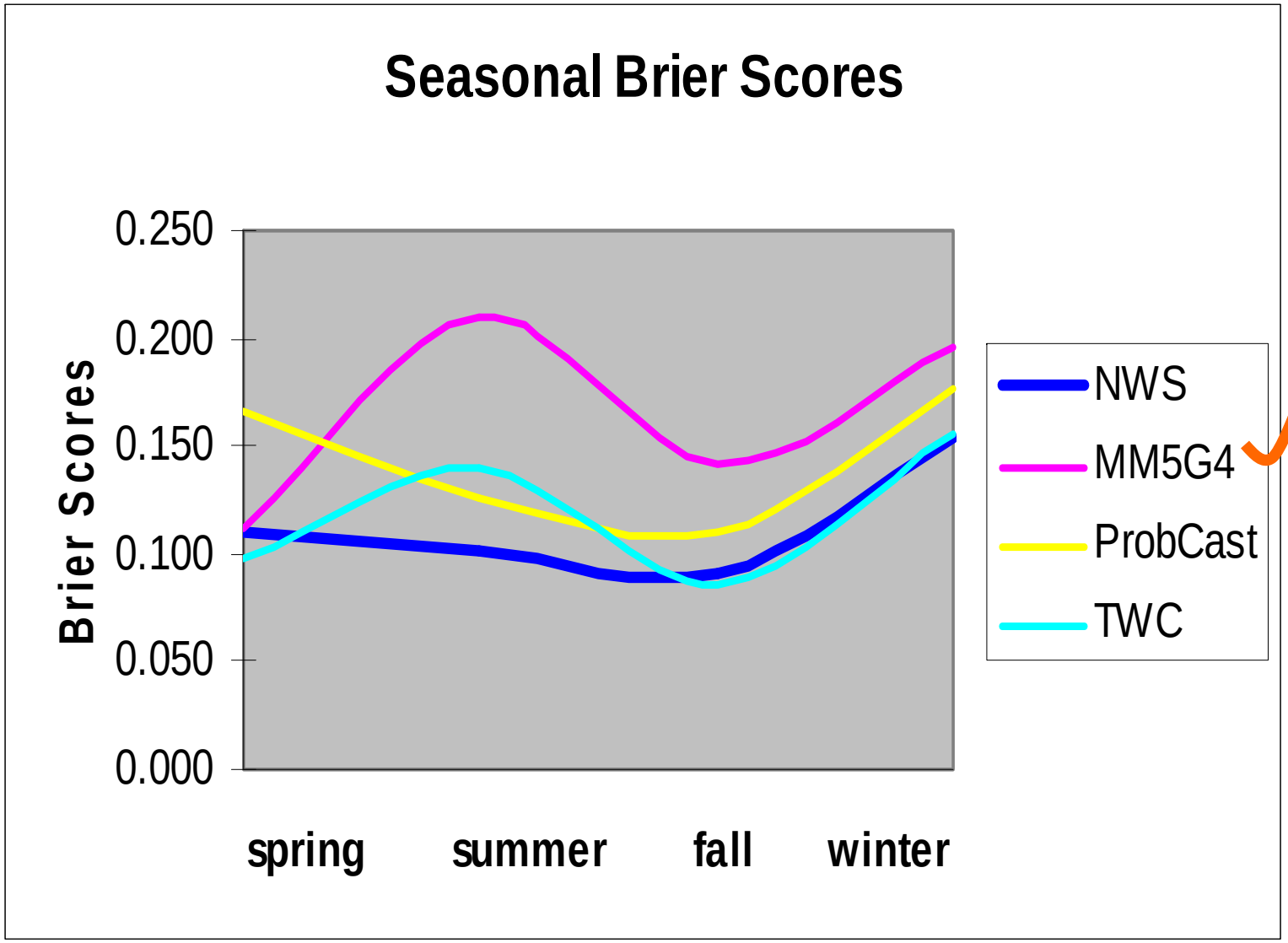
# University of Washington Products

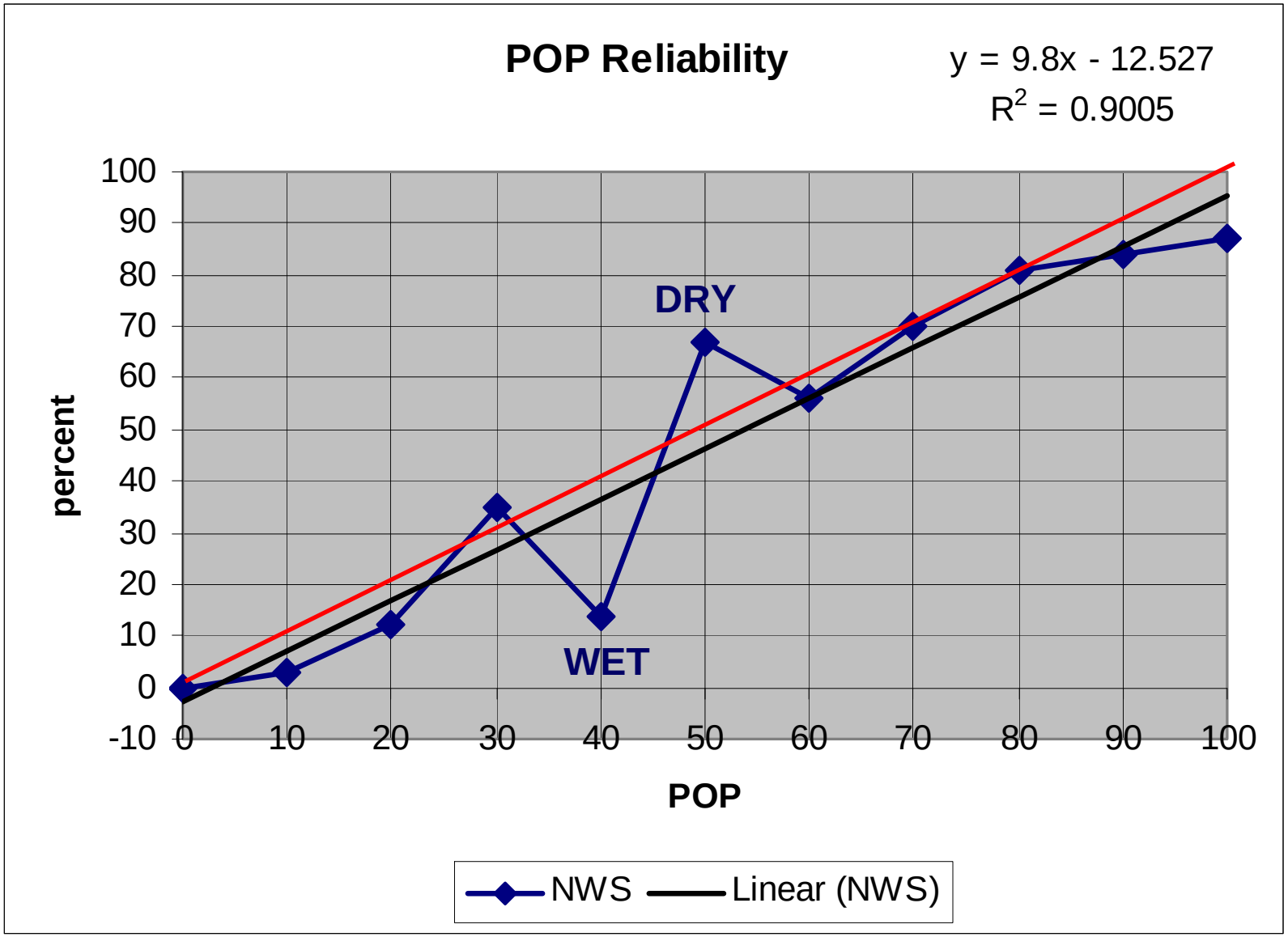


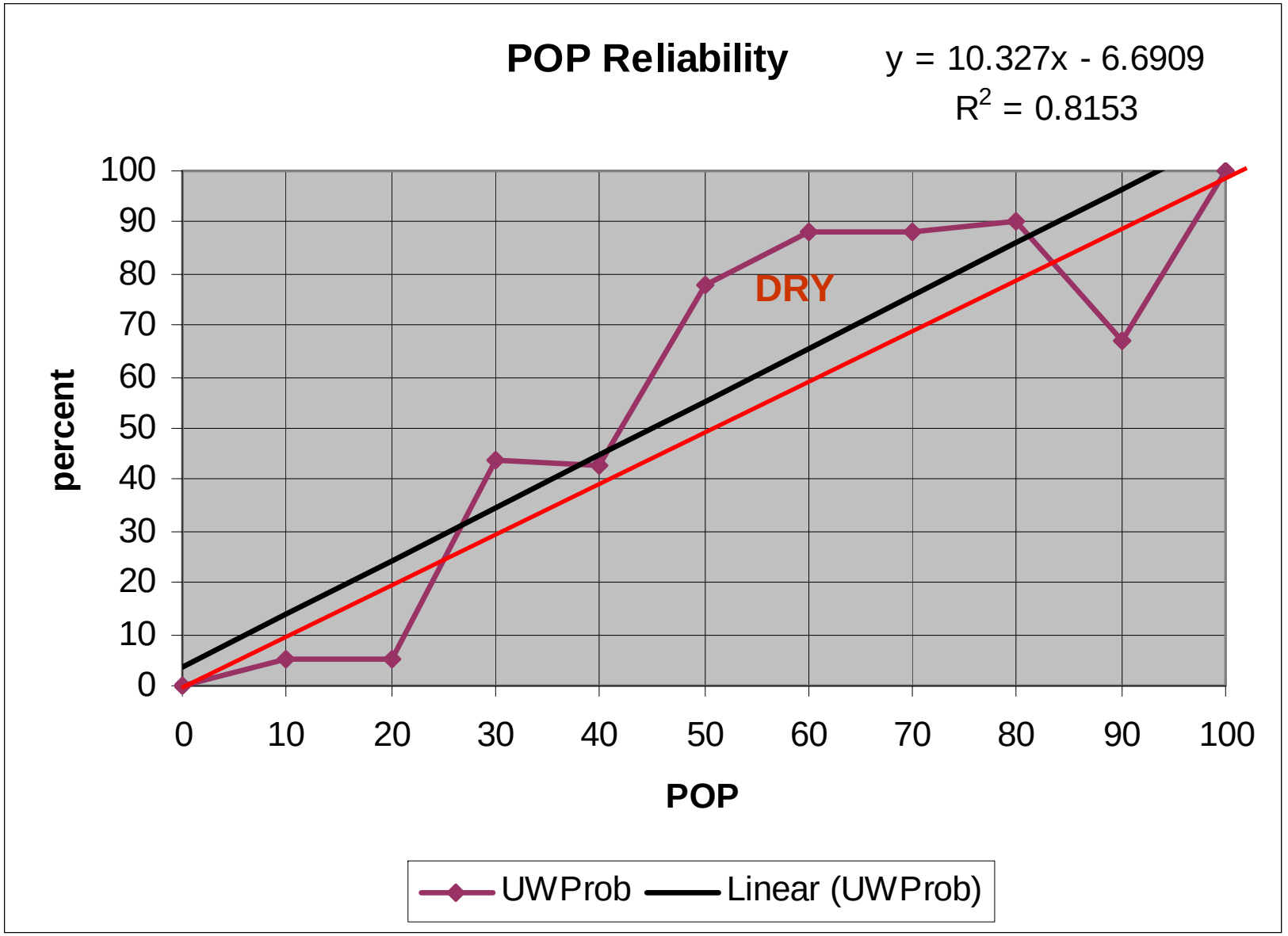

Seasonal Brier Scores
Brier Score
0.250
0.200
0.150
0.100
0.050
0.000
spring
summer
fall
winter
NWS
MM5G12
MM5G4
ProbCast
BMA

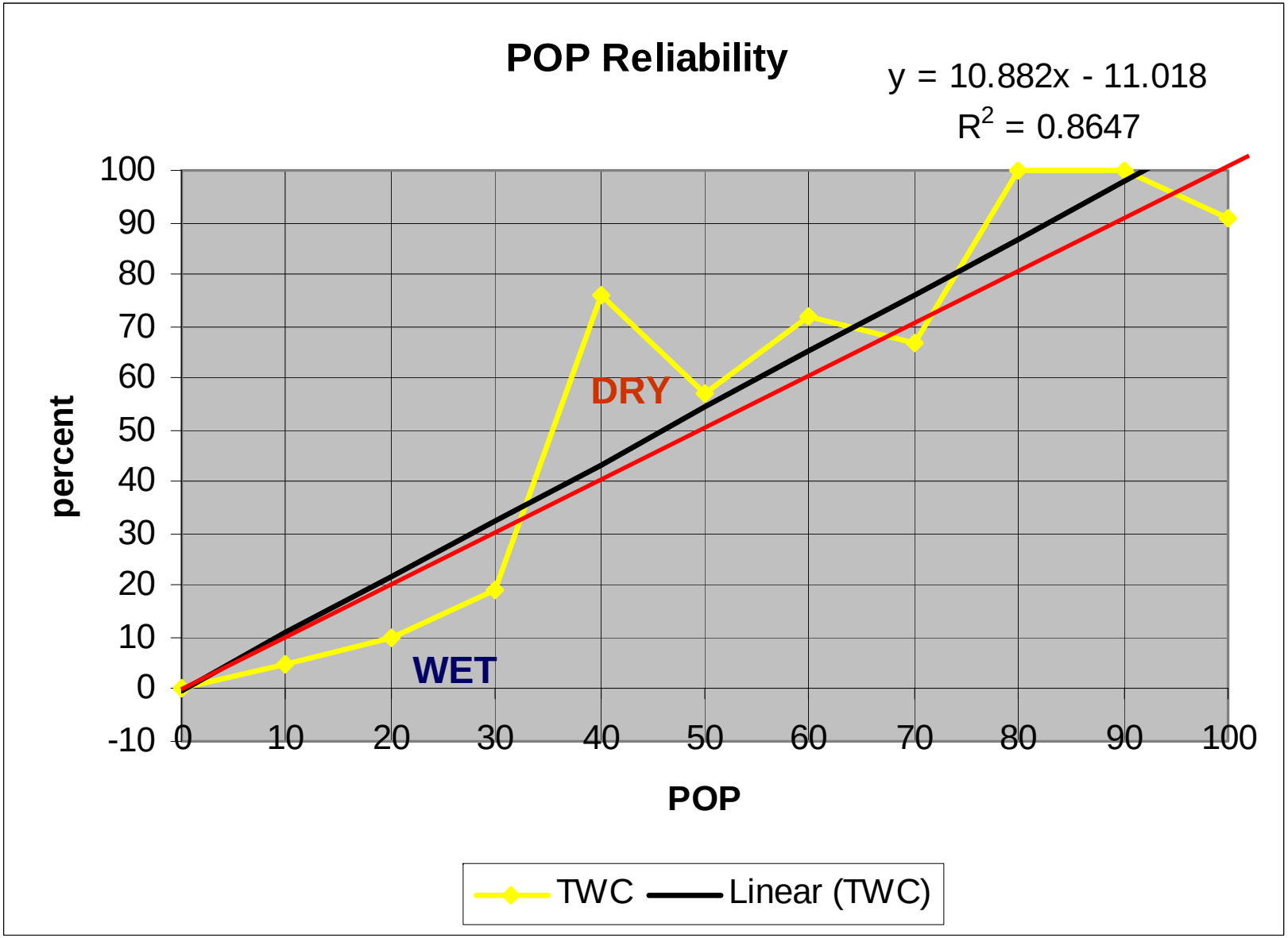
# Private Weather Services

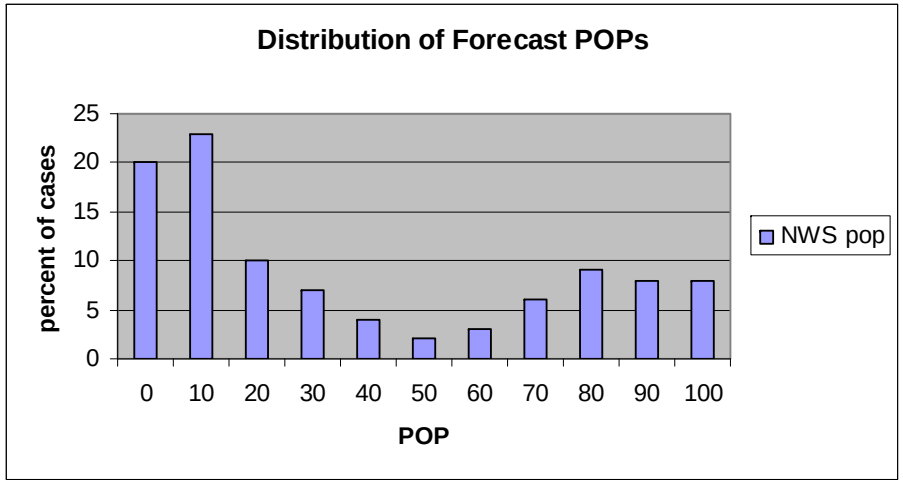


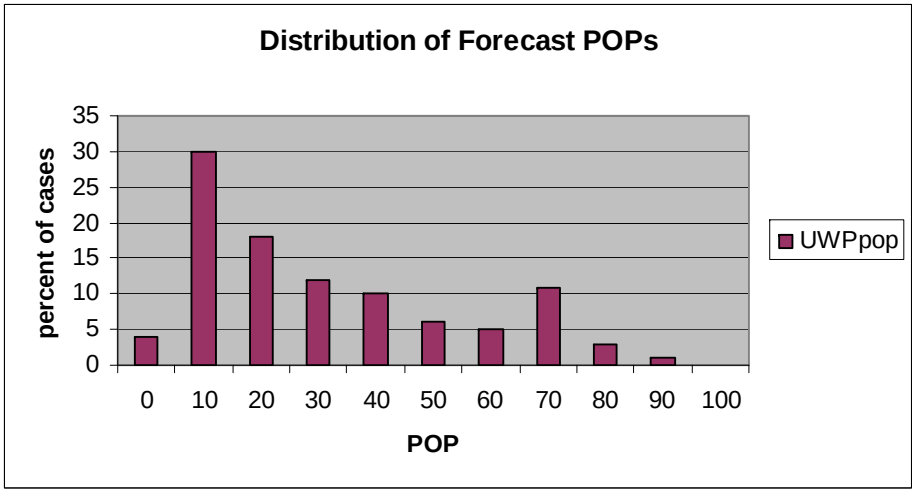

Seasonal Brier Scores
Brier Scores
0.250
0.200
0.150
0.100
0.050
0.000
spring
summer
fall
winter
NWS
MM5G4
ProbCast
TWC

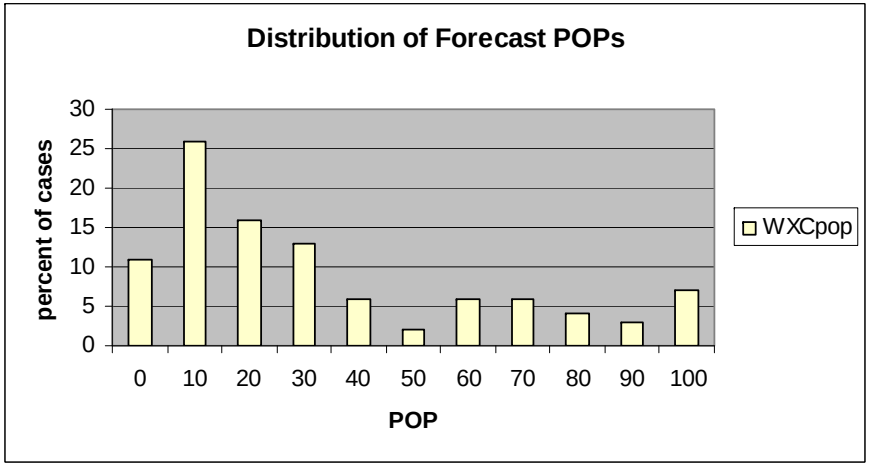

POP Reliability
y = 9.8x - 12.527
R2 = 0.9005
DRY
WET
percent
POP
100
90
80
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
NWS
Linear (NWS)

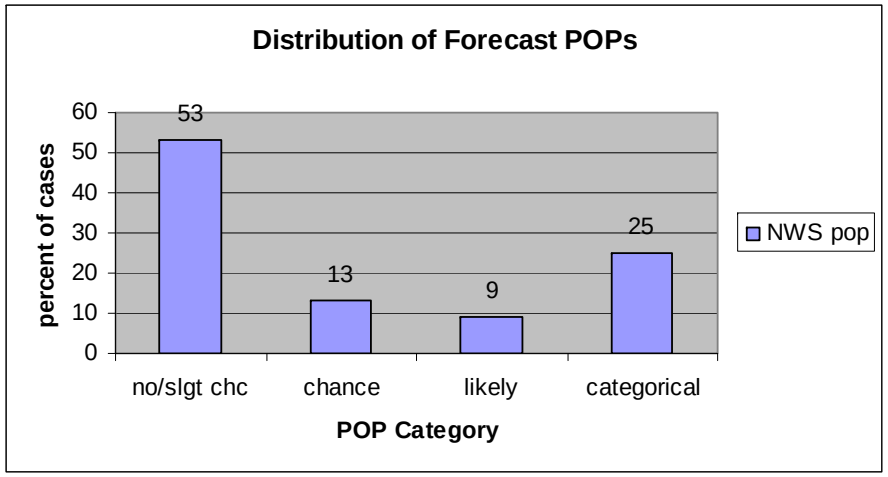

POP Reliability
y = 10.327x - 6.6909
R2 = 0.8153
DRY
percent
POP
0
10
20
30
40
50
60
70
80
90
100
UWProb
Linear (UWProb)

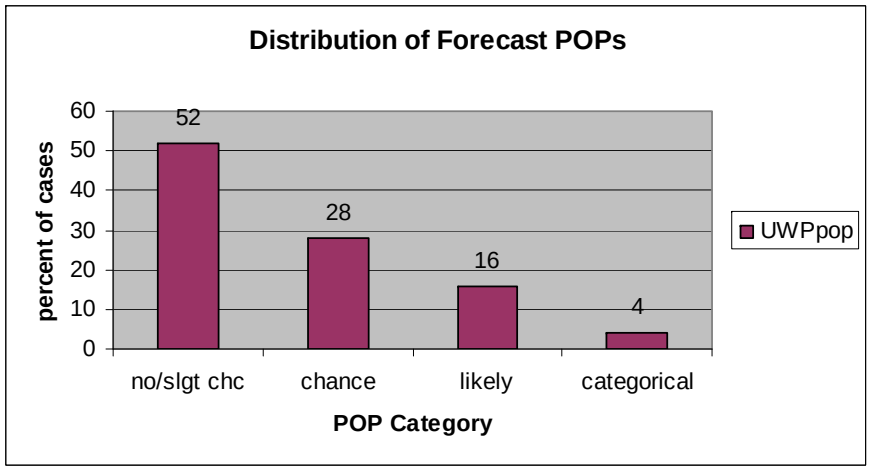

POP Reliability
y = 10.882x - 11.018
R2 = 0.8647
percent
100
90
80
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
DRY
WET
POP
TWC
Linear (TWC)

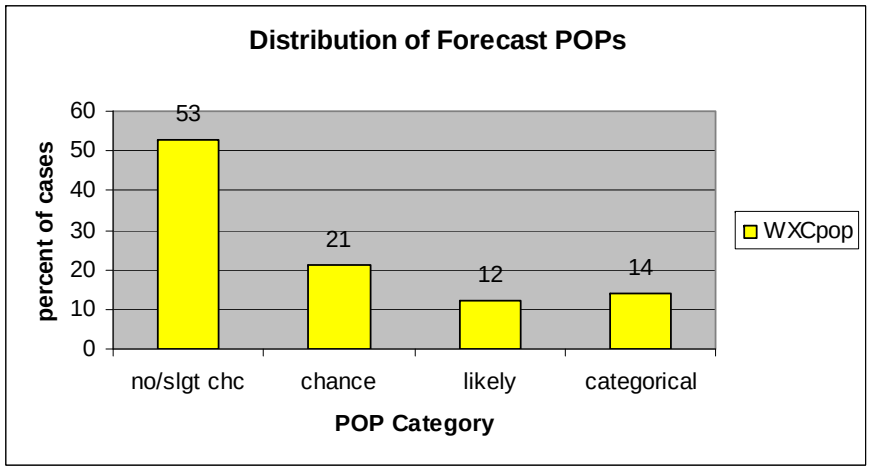

Distribution of Forecast POPs
percent of cases
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
POP
NWS pop

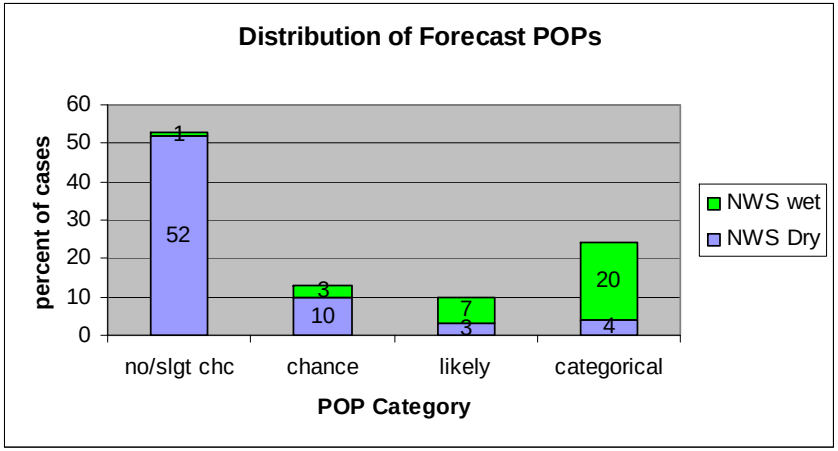

Distribution of Forecast POPs
percent of cases
35
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
POP
UWPpop

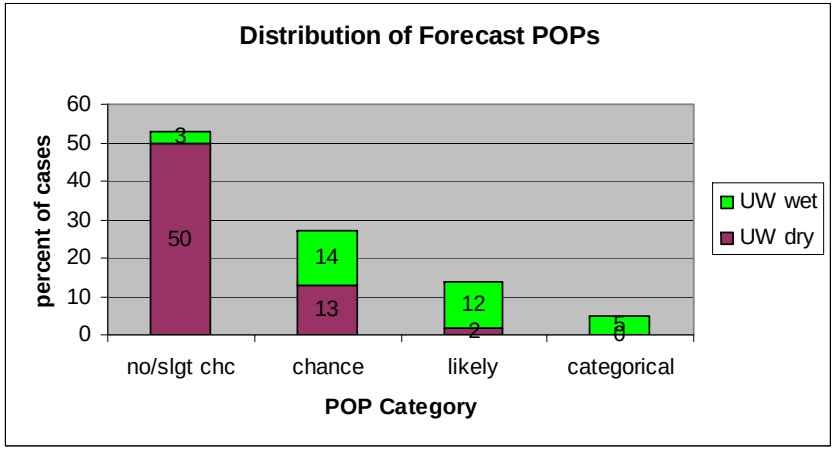

Distribution of Forecast POPs
percent of cases
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
POP
WXCpop

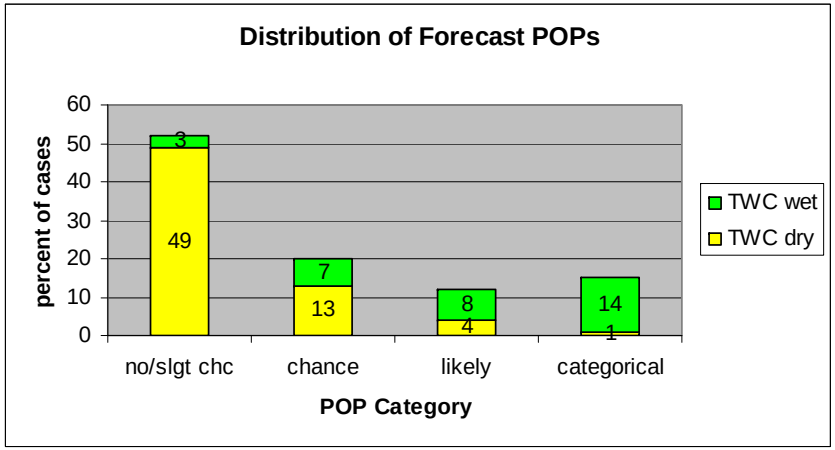

Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
53
13
9
25
no/slgt chc
chance
likely
categorical
POP Category
NWS pop

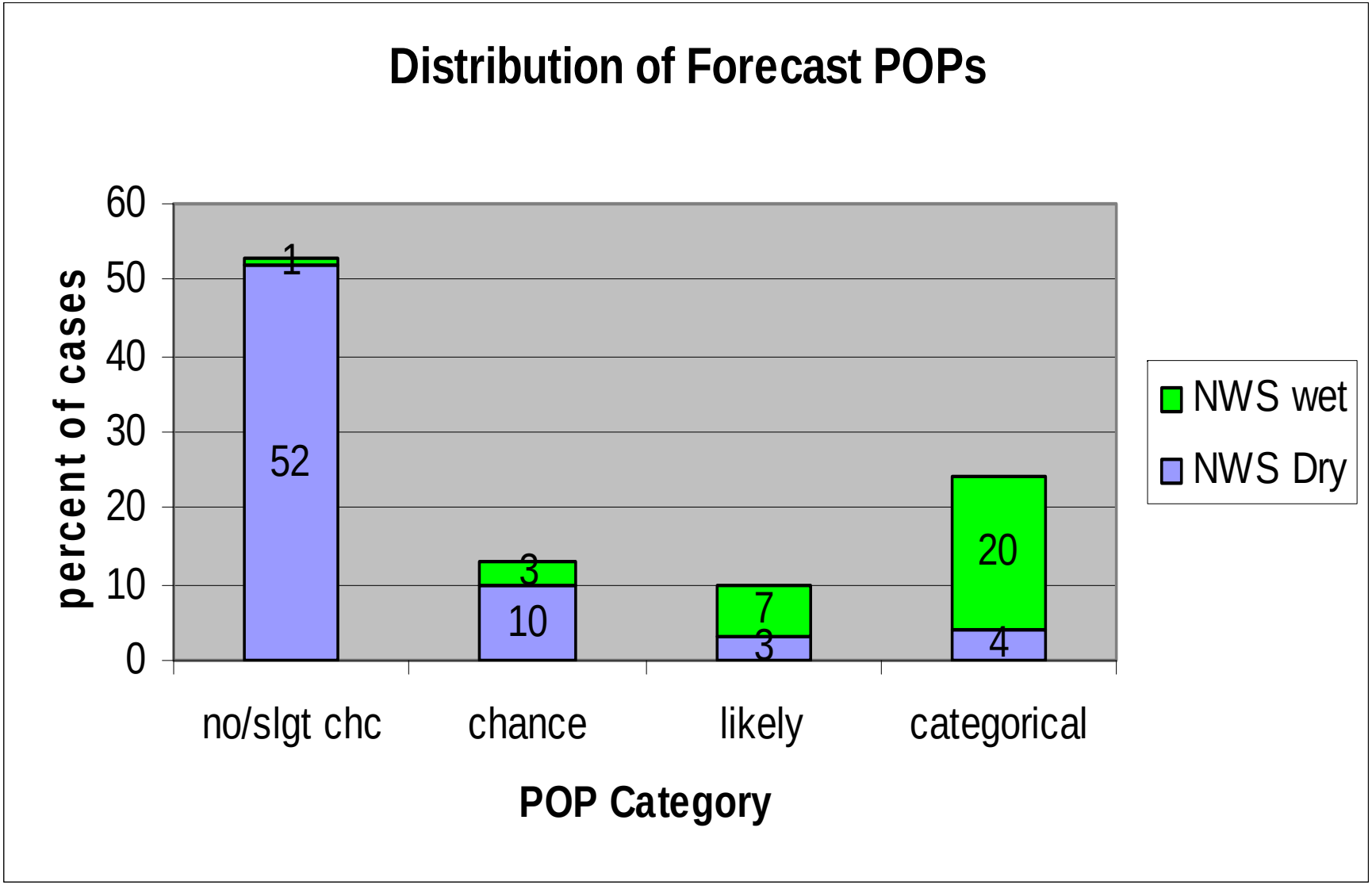

Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
52
28
16
4
no/slgt chc
chance
likely
categorical
POP Category
UWPpop


Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
53
21
12
14
no/slgt chc
chance
likely
categorical
POP Category
WXCpop


Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
1
52
3
10
7
3
20
4
no/slgt chc
chance
likely
categorical
POP Category
NWS wet
NWS Dry


Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
3
50
14
13
12
2
5
0
no/slgt chc
chance
likely
categorical
POP Category
UW wet
UW dry

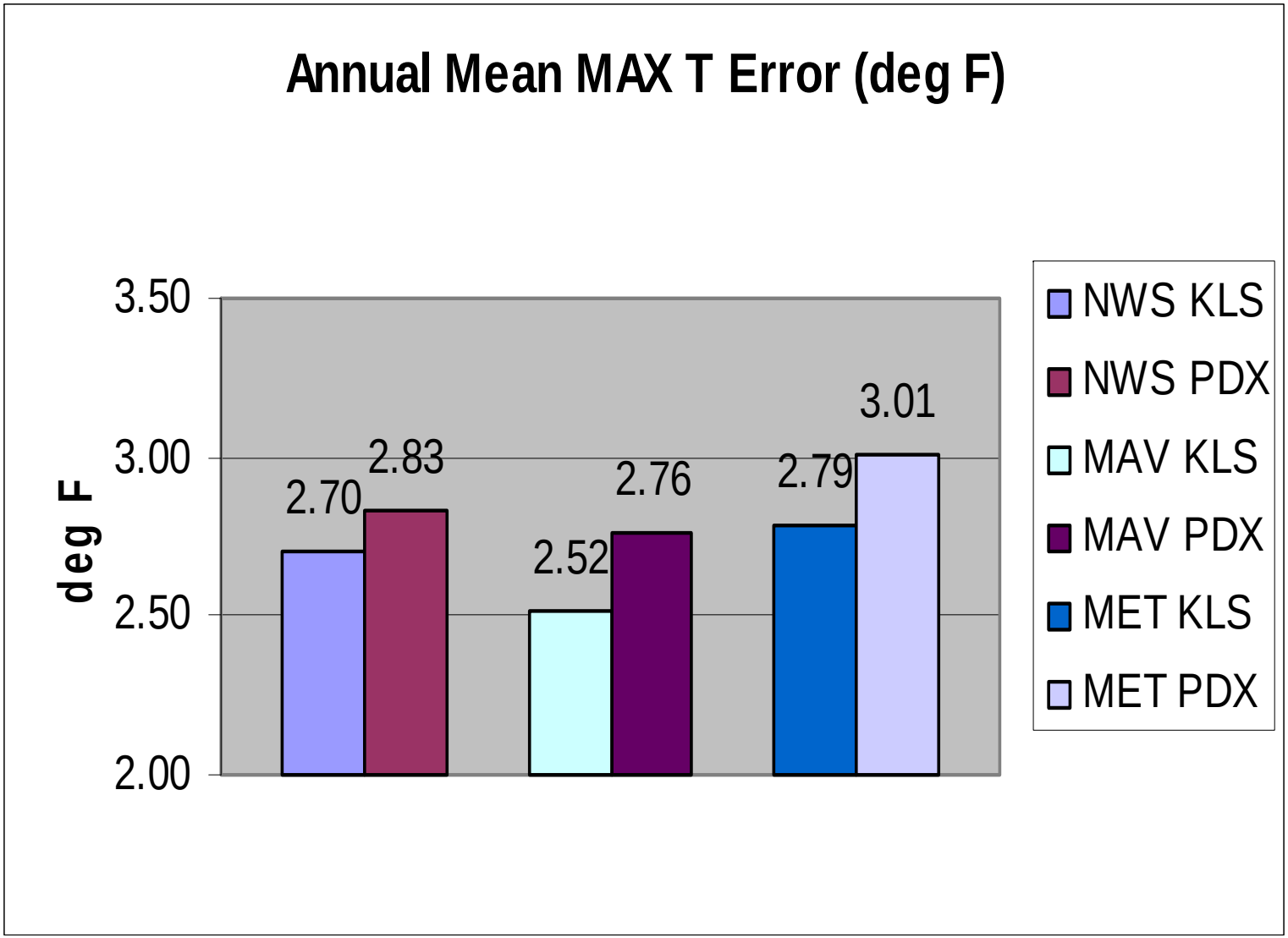

Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
3
49
7
13
8
4
14
1
no/slgt chc
chance
likely
categorical
POP Category
TWC wet
TWC dry

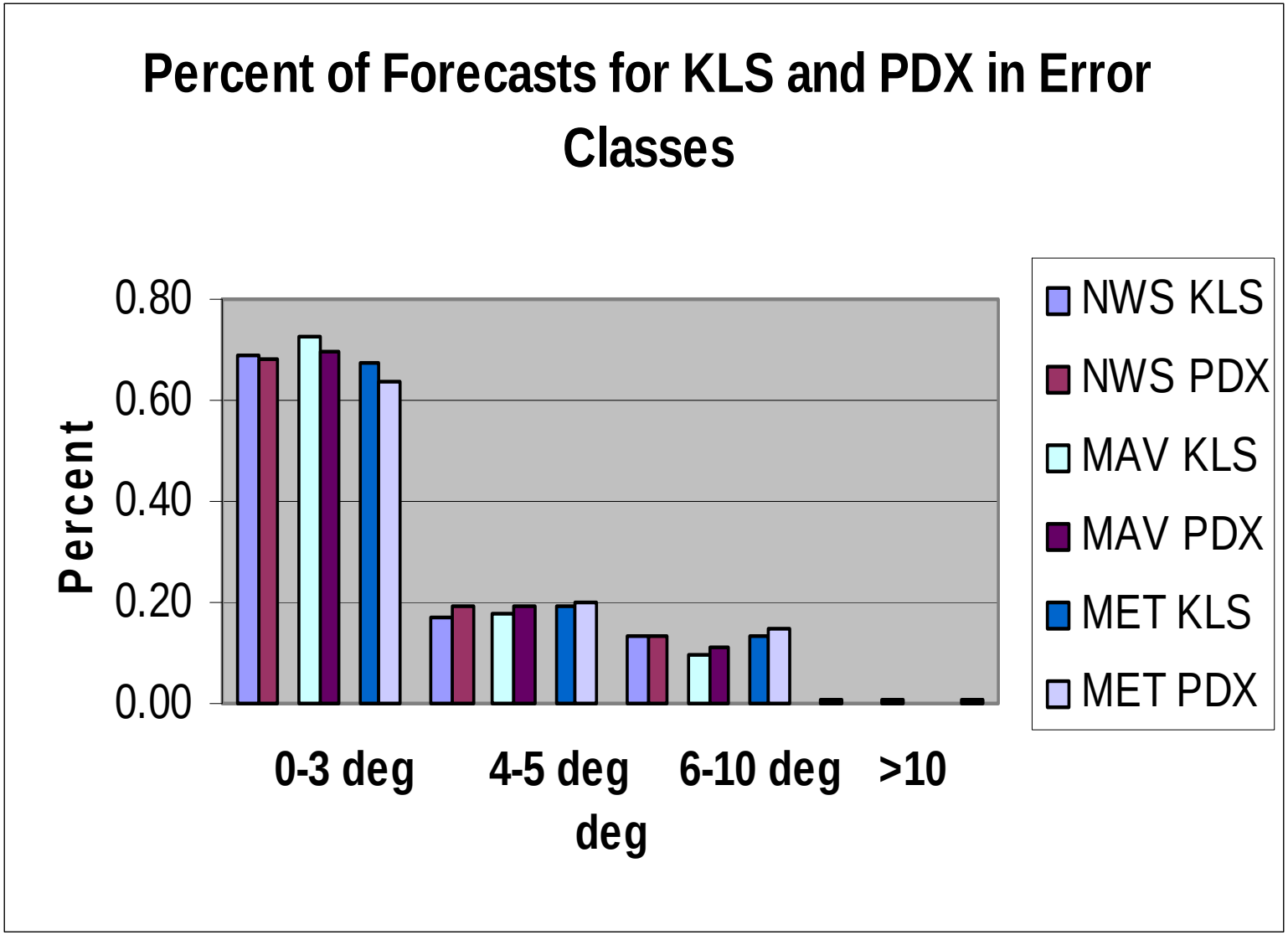

Distribution of Forecast POPs
percent of cases
60
50
40
30
20
10
0
1
52
3
10
7
3
20
4
no/slgt chc
chance
likely
categorical
POP Category
NWS wet
NWS Dry

# Answers to initial questions

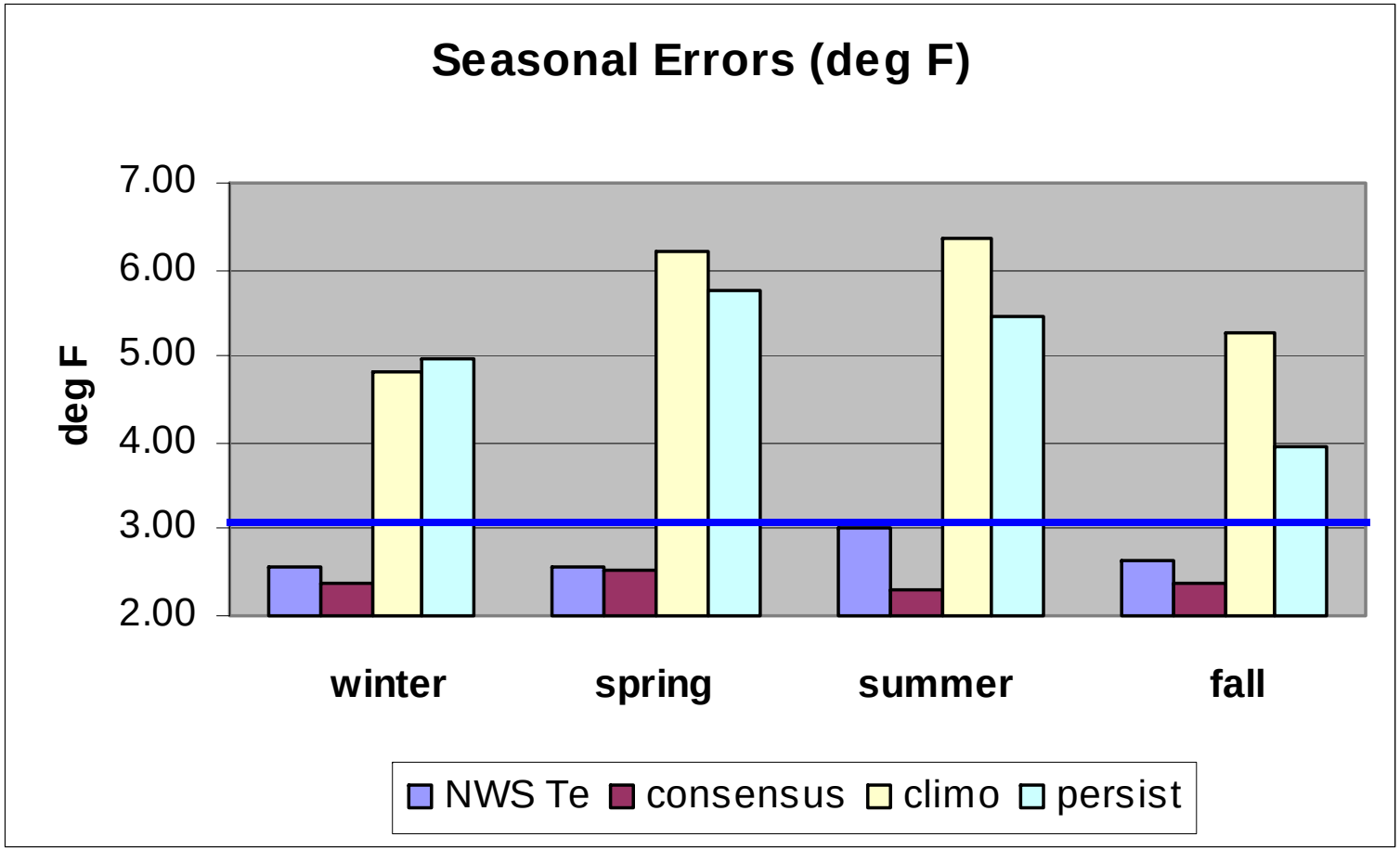
- It appears that yes, there is a forecast source for my house that consistently is better than the others – **NWS**
- Are the forecasts useful – yes, **89** percent of forecast maximum temperatures are within **3** degrees F and **87** percent of measurable rain events were forecast as **likely** or **categorical**.
- What about quality of “forecasts for the edge” versus for “metro” areas?

- Look at forecasts for both Kelso and for Portland by:
  - **Guidance,** and
  - **Forecasters** at NWS Portland


Annual Mean MAX T Error (deg F)
deg F
3.50
3.00
2.50
2.00
2.70
2.83
2.52
2.76
2.79
3.01
NWS KLS
NWS PDX
MAV KLS
MAV PDX
MET KLS
MET PDX


Percent of Forecasts for KLS and PDX in Error Classes
Percent
0.80
0.60
0.40
0.20
0.00
0-3 deg
4-5 deg
6-10 deg
>10 deg
NWS KLS
NWS PDX
MAV KLS
MAV PDX
MET KLS
MET PDX

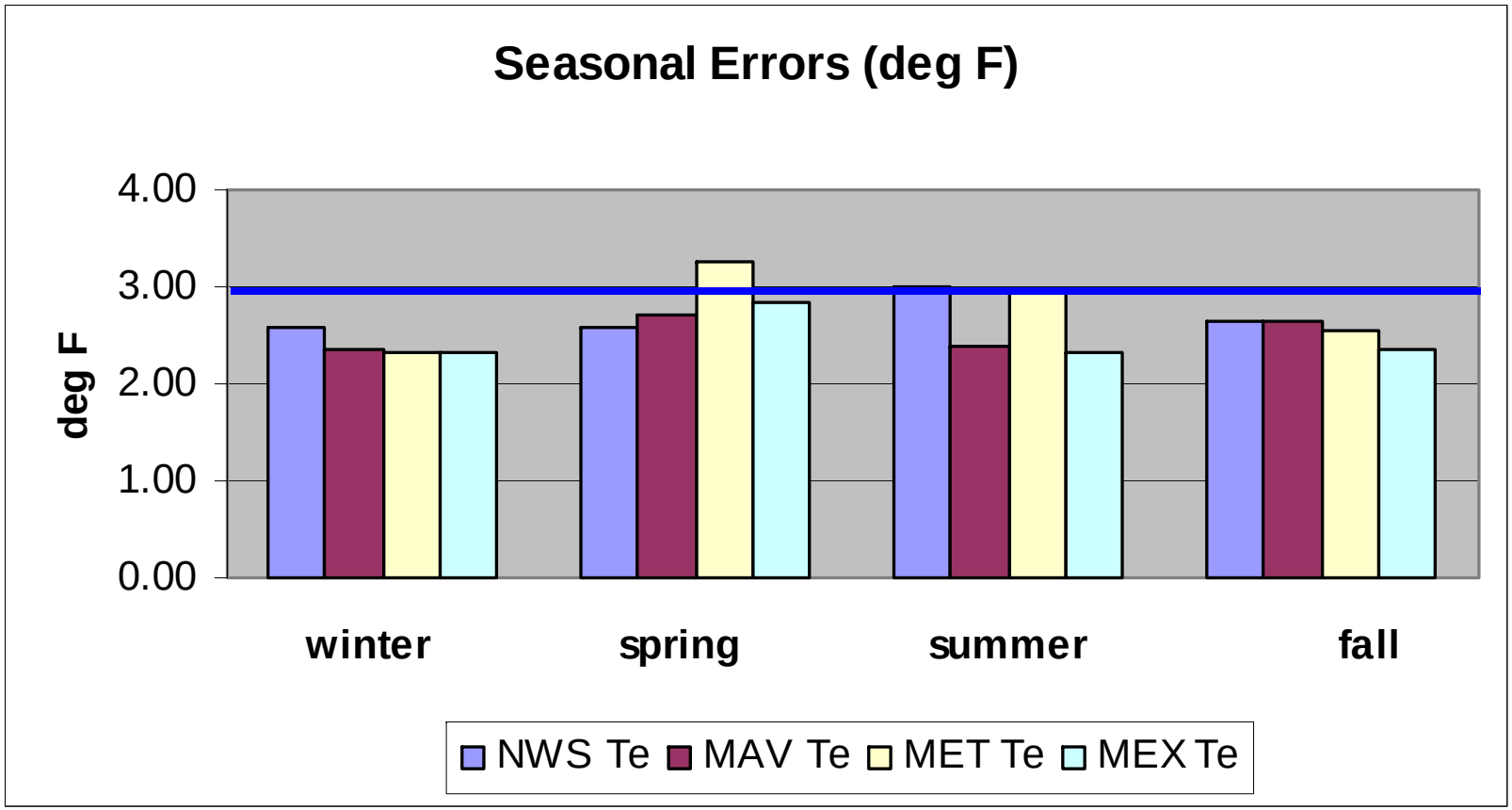
# What about climo and persistence?



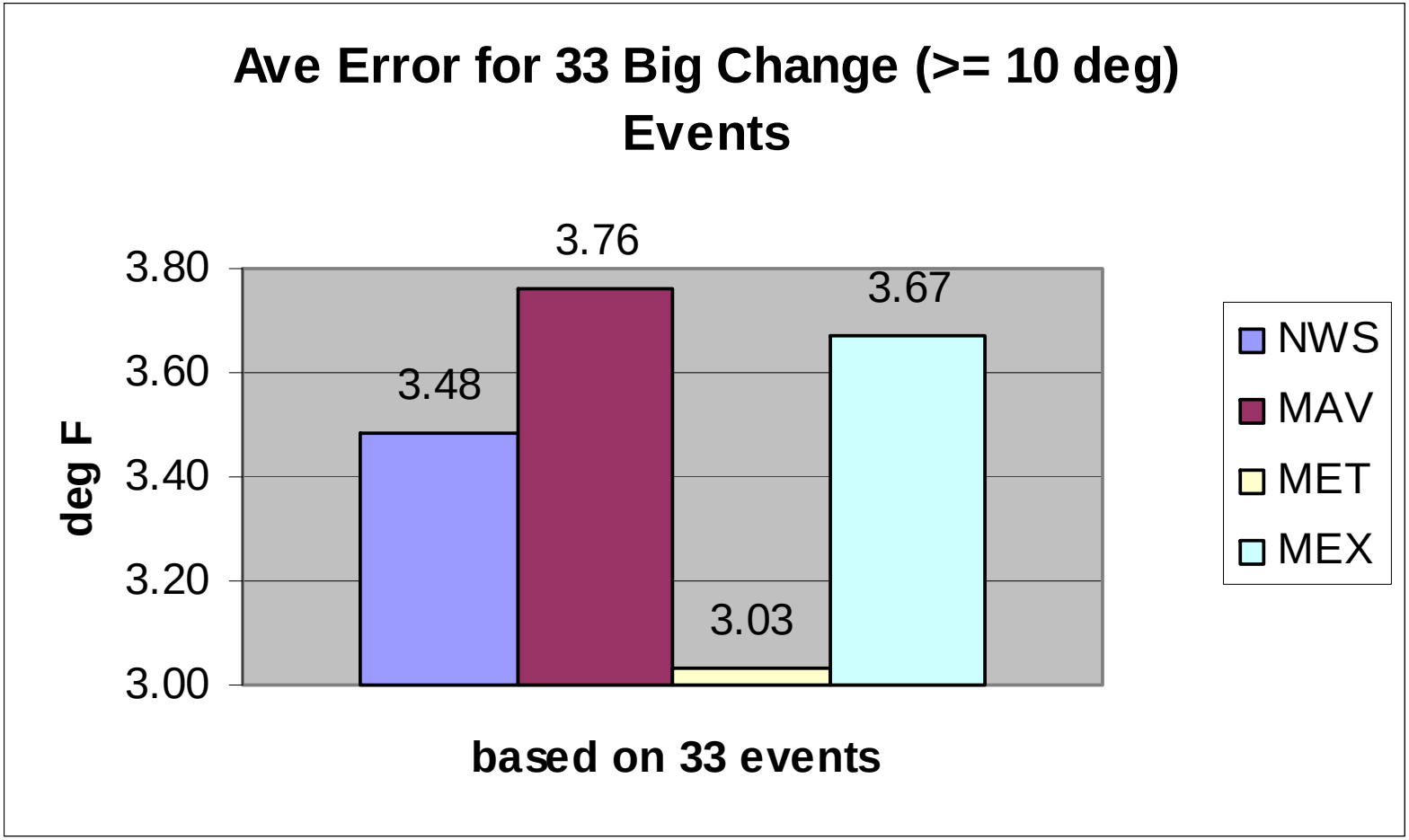
# Conclusions

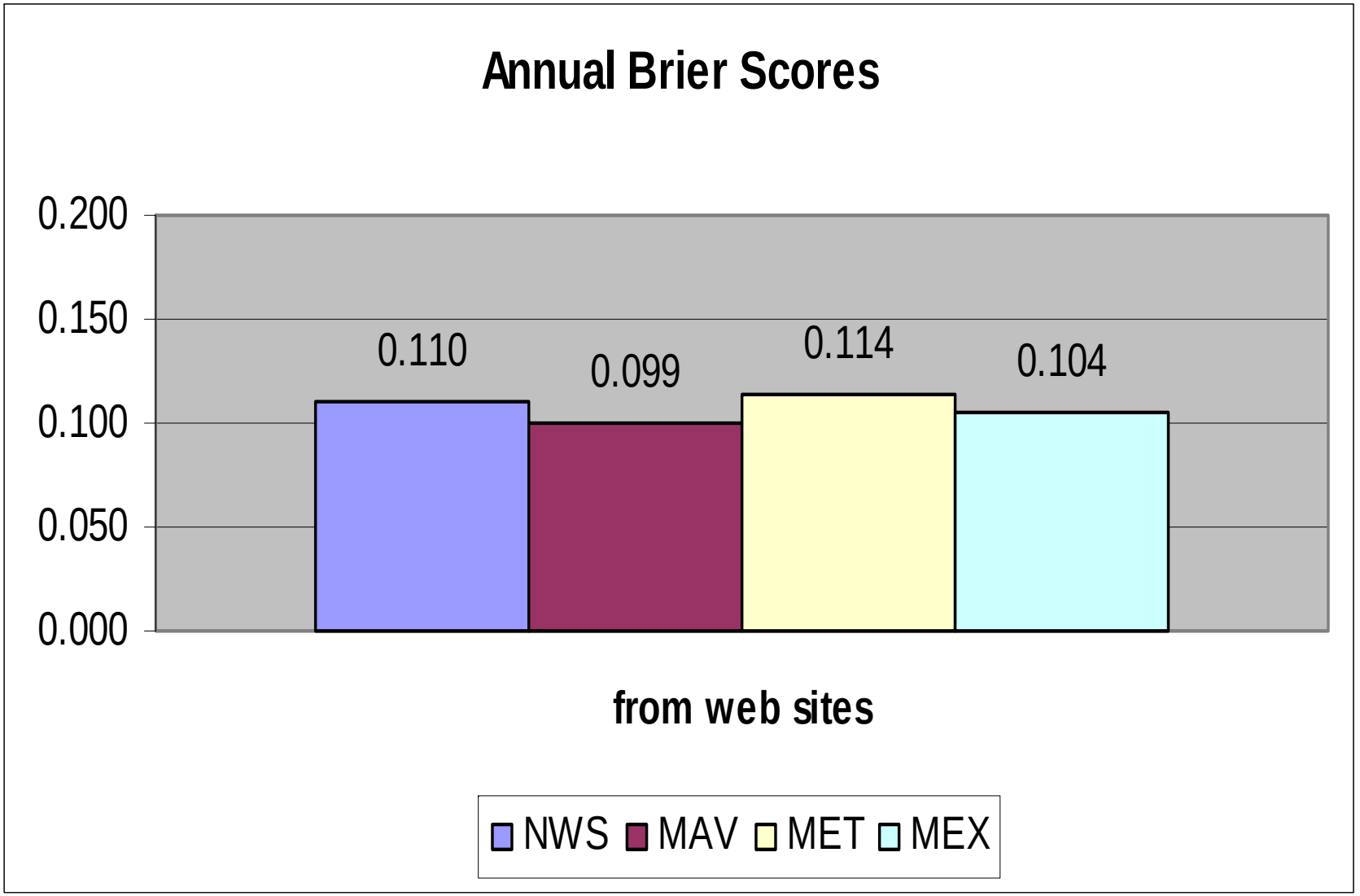
- The NWS forecasts for Kelso improve on guidance similar to the improvement seen for the NWS forecasts for Portland.
- There appears to be no significant degradation of forecasts for this “edge”.
- The forecasts are significantly better than persistence and climatology forecasts.
- The NWS forecasts are consistently the best, and are quite useful as a planning tool.

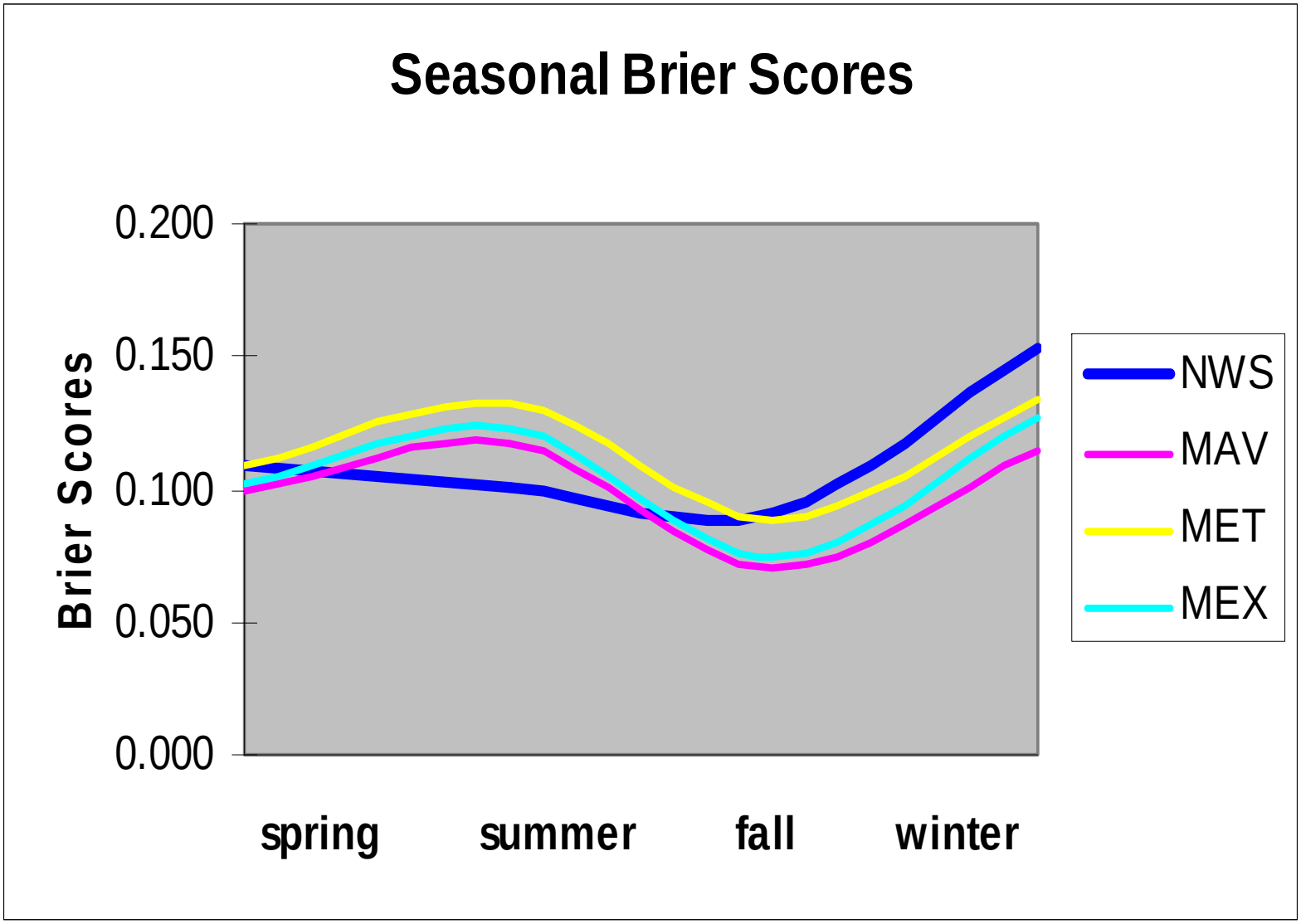
# Day to day guidance – MAV wins!



# But for big change events – MET shines




Annual Brier Scores
0.200
0.150
0.100
0.050
0.000
0.110
0.099
0.114
0.104
from web sites
NWS
MAV
MET
MEX


Seasonal Brier Scores
Brier Scores
0.200
0.150
0.100
0.050
0.000
spring
summer
fall
winter
NWS
MAV
MET
MEX